THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

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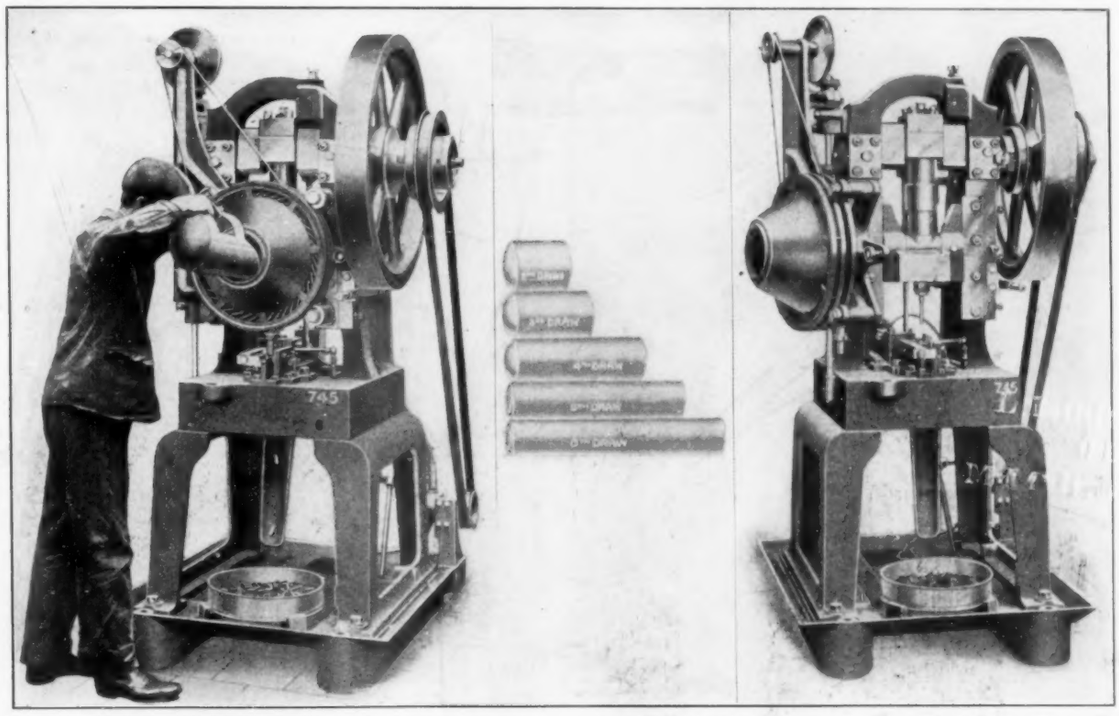
THE MANUFACTURE OF RIFLE CARTRIDGES

A DESCRIPTION OF ENGLISH PRACTICE IN THE PRODUCTION OF METAL CARTRIDGE SHELLS, THE PRIMER, THE CAP, THE BULLETS, THE POWDERS, AND THE LOADING OF THE SHELLS.

BY WALTER HEAP.

An article was published in the January, 1910, number of The Metal Industry relating to the manufacture of cartridge cases in America. This article treated almost entirely of the production of the shell itself and went no further. We are now, in the following article, able to present a description of the manufacture of rifle cartridges in its entirety. It will be found that Mr. Heap has begun at the very beginning and gives a most excellent description of the industry, including the formation of the shell, the making of the bullet, the cap, the powder and finally describing the loading of the cartridge. The January, 1910, article was a description of American practice while the present one reflects that of England.—Ed.

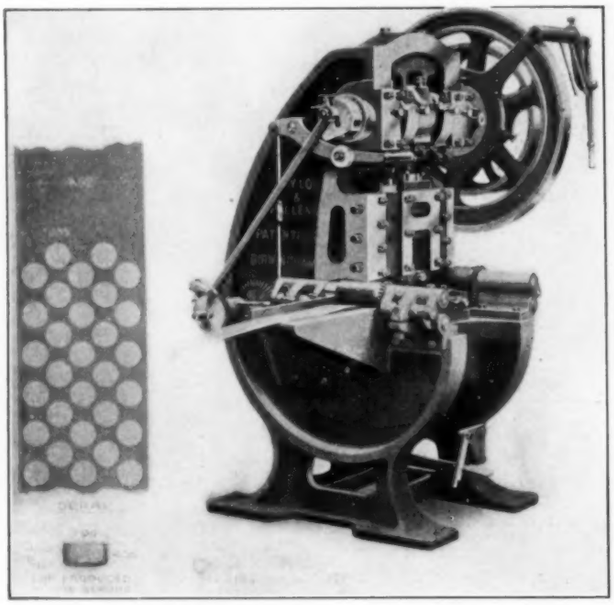


MACHINE FOR DRAWING CARTRIDGE SHELLS. MADE BY TAYLOR & CHALLEN, LTD., BIRMINGHAM, ENGLAND.

This industry may conveniently be divided into six sections, viz.: (1) Cartridge case, (2) Bullet case or cover, (3) Bullet, (4) Cap, (5) Cordite, and (6) Loading. The production of brass strip for the cartridge case, and the nickel steel strip for the bullet cover is in the hands of the metal rollers and steel makers, from whom it is obtained of the required thickness and the standard commercial width. (1) The cartridge cases are solid drawn from brass discs punched out of strip, a little wider than the diameter of the disc. The first operation in making cartridge cases is that of cutting the metal into straight, narrow strips, which is accomplished on a circular or disc shearing machine. This strip is now operated upon in the cutting and cupping machine, which punches out a disc and forms it into a cup at one operation. The machine is provided with a suitable automatic feeding arrangement, which moves the strip along after each stroke. The metal was not annealed after the "finish" rolling by the makers, and the additional work put into the metal by punching and cupping renders it unfit for further operations until it has been annealed.

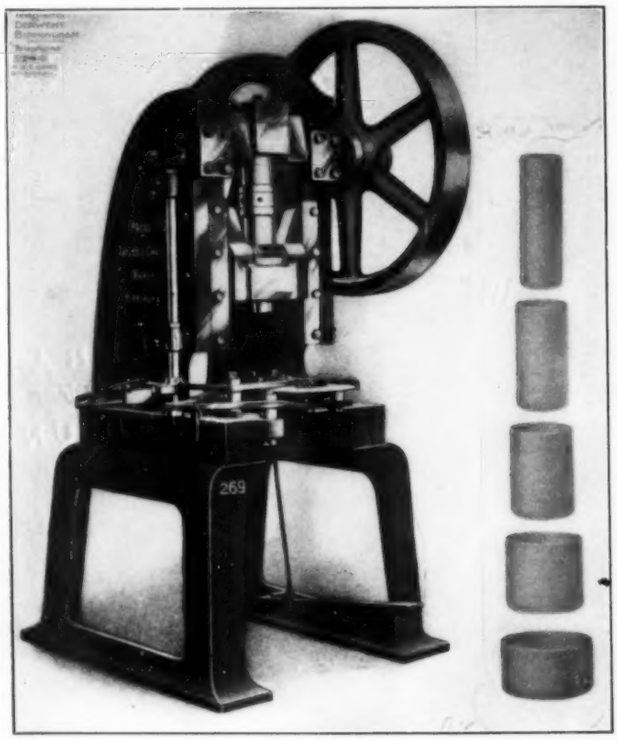
The annealing of the cups is done in a special revolving furnace, and they are then quenched in cold water. Then follow two or three drawings and an

annealing after each draw. The open end of the case will by this time require trimming, which is done in a small, special lathe fixed on a bench. This operation



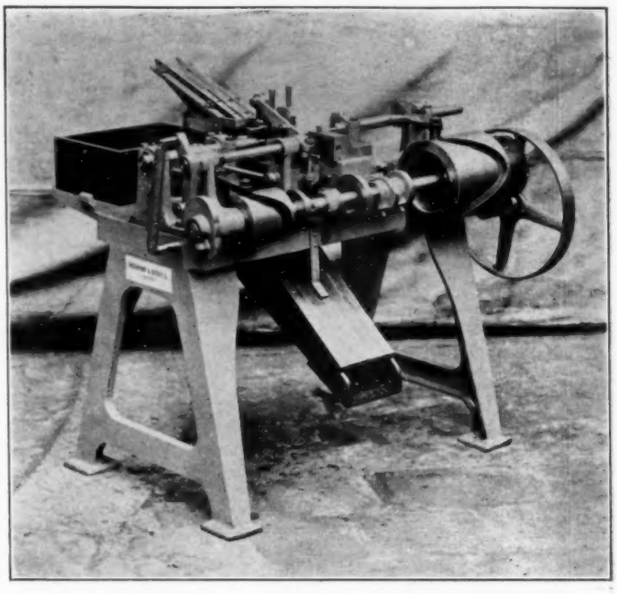
CUTTING-OUT AND CUPPING PRESS. TAYLOR & CHALLEN, LTD., BIRMINGHAM.

always follows a drawing, and the annealing comes after, then the case goes to the indenting machine and is indented, thus forming the anvil for the cap and



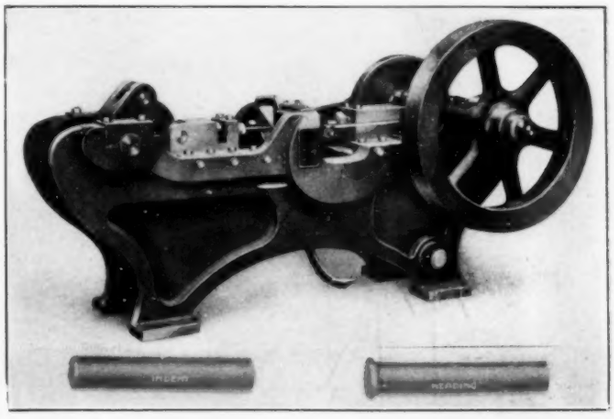
TURN-TABLE FEED DRAWING PRESS FOR DRAWING OR EXTENDING CUPS. TAYLOR & CHALLEN, LTD.

the cap chamber. The case is again drawn, and after this drawing it is cleaned in addition to the annealing. The cleaning is done after the annealing and consists of pickling in dilute sulphuric acid and washing in clean running water to remove all trace of acid.



MACHINE FOR TURNING HEAD AND CUTTING CARTRIDGE CASE TO LENGTH. MADE BY GREENWOOD & BATLEY, LEEDS, ENGLAND.

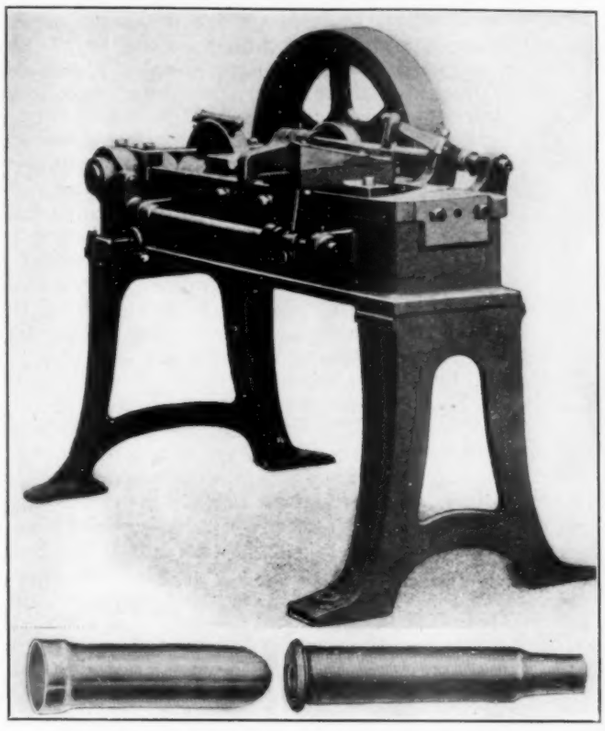
After the next drawing the case is cut to length and then finally annealed and cleaned. It should be mentioned here that the drawing machines for the later and longer draws run slower than those for the earlier and shorter ones. The drawing operations require generous lubrication, and a convenient way of obtaining this is to place the cases in a receptacle containing the lubricant, from which they are taken by hand and placed in the drawing dies. The lubricant is a mixture of soap, oil and water.



HORIZONTAL PRESS FOR INDENTING AND HEADING THE CARTRIDGE SHELL. TAYLOR & CHALLEN, LTD.

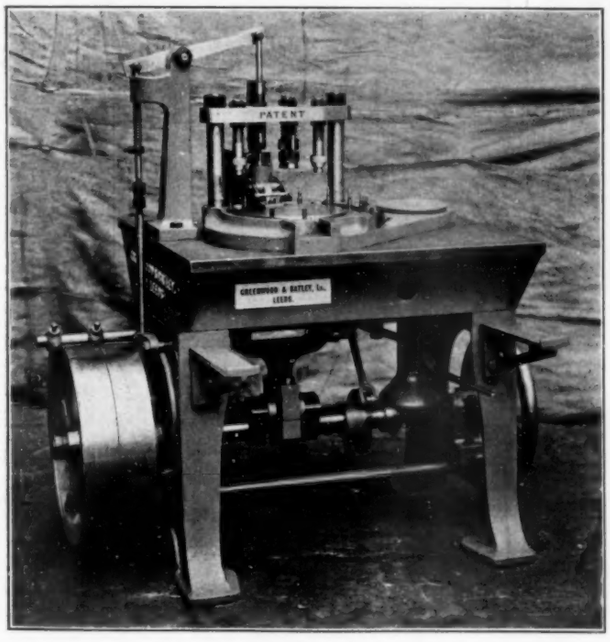
The next operation is heading, which forms the shoulder or collar at the base of the cartridge. The case is now ready for necking; this means three operations: one for semi-annealing, i. e., annealing that portion of case which has to be necked, and this is done in a special annealing machine. After the annealing the case is tapered and then necked, reducing the internal diameter of a portion of the case to that

of the bullet. The following four operations complete the case, viz., rectifying cap chamber, trimming head



HORIZONTAL PRESS FOR TAPERING, DRAWING AND EXTENDING. TAYLOR & CHALLEN, LTD.

in special lathe on bench, piercing fire holes, and reamering case for bullet. To complete the cartridge

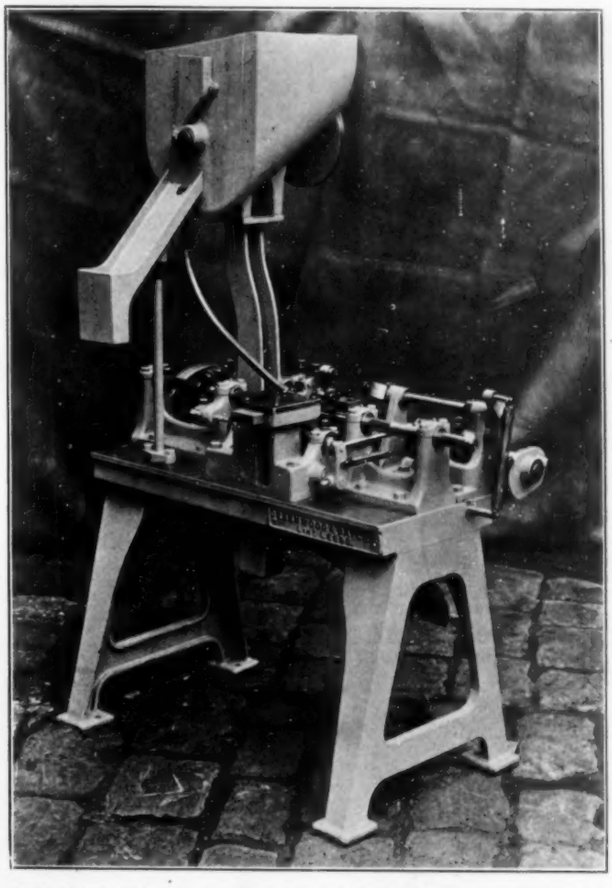


PATENT NECKING, BULLETING, INDENTING AND CONING MACHINE FOR .303 CARTRIDGE CASE. GREENWOOD & BATLEY.

there will be the operations of capping, loading, inserting bullet and canneluring, and these operations are accomplished in that part of the works called the danger zone or field.

(2) The bullet cover is made in very much the same manner as the case: A strip is cut to width upon the circular shears, a disc punched and cupped out of the strip at one operation, annealed and drawn several times, cut to length, the point formed, the lead bullet or core inserted, the cover turned over the base of core and cannelured to form the groove into which the case (the last operation on the cartridge mentioned in section 1) to secure the bullet in the case.

(3) The lead bullet or core is made from a lead rod, which is extruded or squirted from a hydraulic press, and as it comes from the press it is coiled on a



TRIMMING MACHINE WITH AUTOMATIC FEED. GREENWOOD & BATLEY.

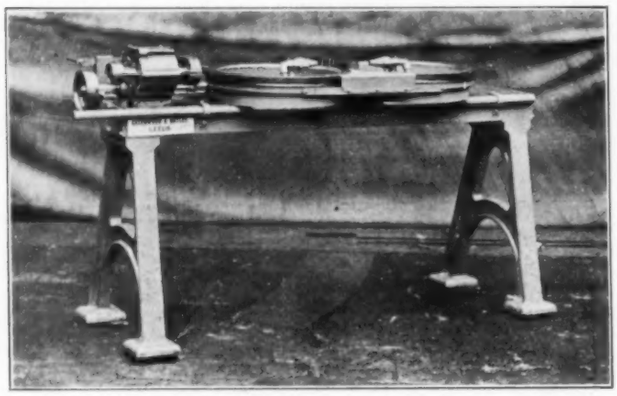
reel. This reel is taken to the bullet forming machine, which cuts pieces off the rod and forms them into bullets, provision is made in the die for the escape of excess lead.

(4) The cap is a composition consisting of fulminite of mercury, sulphide of antimony, chlorate of potash, sulphur and mealed powder.

(5) Nitro glycerin, gun cotton, mineral jelly, and acetone enter into the composition of cordite. The process of the manufacture of these ingredients is outside this article, but a general description of the manufacture of cordite from these ingredients is relevant. Cordite takes its name from the fact that it is made in the form of a cord, the diameter of which varies from .0375-inch for the .303 L. M. rifle to .5-inch diameter for say a 12-inch naval gun. The cord is

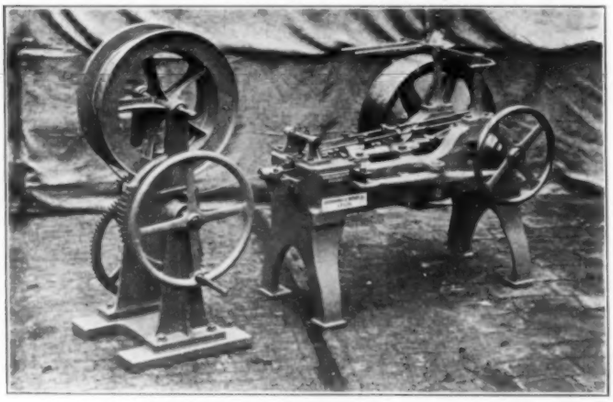
251941

cut into suitable lengths, and the required number of pieces bundled together to form the requisite charge for a cartridge. Cordite is not described or identified by the diameter; .0375 inch is known as 3¾ and .5 inch as 50 cordite, and to indicate the length into which the cord is cut as well as the diameter, the expression takes the form of a fraction, e. g. Cord having a diameter of .2 inch and a length of 14 inches is expressed or described thus, $\frac{20}{14}$. The numerator of the fraction is found by multiplying the diameter .2 inch $\times$ 100 = 20, and the denominator indicates the length in inches.



SEMI-ANNEALING MACHINE, WITH TWO TABLES, TO ANNEAL THE MOUTH OF CARTRIDGE CASE. GREENWOOD & BATLEY.

To proceed with the description of the manufacture of cordite: Gun cotton in the form of a finely divided pulp is pressed into short round bars 6 or 7 inches long and about 3 inches in diameter (with sufficient pressure to fix the gun cotton in that form) which are placed in stoves where it remains until it is dried and until it is required also, the stoves being allowed to cool down when they become store rooms for compressed gun cotton, thus avoiding the danger attached to the removal of such material. When required, and only then, is the compressed gun cotton removed and weighed into wooden boxes, lined with brass, and having lids which cover up the contents during its removal from the drying stoves to the nitro-glycerine factory, where the nitro-glycerine is added; the two are mixed or incorporated by hand. The box lids are replaced and the paste conveyed to the paste stores.



MACHINE TO FORM LEAD BULLETS, WITH REEL. GREENWOOD & BATLEY.

It may be mentioned here that nitro-glycerine is never held in stock, owing to the great danger of explosion; it is used as soon as possible after it is made, and it is also used in the building where the last stage of manufacture is completed, thus minimising the risk as much as possible. The danger of explosion is also less when mixed with the gun cotton, and in a paste it may safely be taken to the paste stoves.

The next process is the introduction of acetone and mineral jelly, which is thoroughly mixed in a mixing machine, then poured into covered boxes and at once conveyed to the presses, converted into cords and thus becomes cordite. These presses are worked by screws through suitable gearing. The thin cordite for rifle cartridges, which is the cordite referred to in this article, is wound on reels as it comes from the press, and then taken on suitable trucks to the drying room, the temperature of which is maintained at 38 deg. C. by means of steampipes. The time required for drying is from three to five days, according to the thickness of the cordite. This drying completes the manufacture of cordite, in a general way. The uniformity of different batches of cordite cannot be guaranteed, so in order to obtain the nearest approach to absolute uniformity, the different batches are systematically mixed. This is called blending, and when 50 to 70 cords are made into a rope (without any twist) a very good result is obtained—this rope is wound upon a reel.

(6) It is from the reel just mentioned that the loading machine takes the cordite, cuts it into suitable lengths and places it in the cartridge case, after which is inserted the wad, followed by the bullet, and the canneluring, already mentioned, completes the cartridge. This article has nothing to do with the packing and storing of the finished cartridge. Some forty-five operations have been performed, resulting in the production of a rifle cartridge, and when it is remembered that the greatest accuracy is required all the way through these operations, the dangerous materials used without accidents, and the price at which the cartridges can be bought, one cannot help being impressed with the ingenuity and skill which has been brought to bear in the designing and building of such machinery. It is a fine object lesson which teaches that to produce articles in large quantities they must be made accurately, and that there must also be proper organization and discipline.

PRODUCTION OF SPELTER.

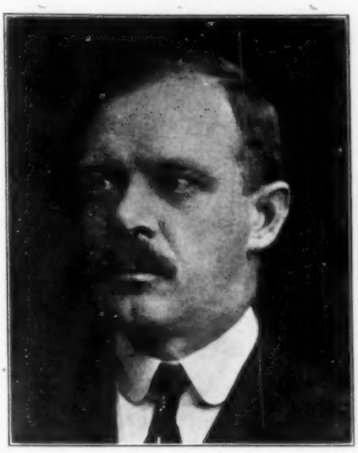
Statistics compiled by the United States Geological Survey show that the production of spelter or metallic zinc from ore for the first six months of 1911 was 140,196 short tons, a gain of more than 5,000 tons over half the record output of 1910. Of this production, 5,135 tons was made from foreign ore. Spelter stocks were reduced from 23,232 tons to 17,788 tons. Imports remained about the same, but exports were nearly double those of half the preceding year. The apparent consumption of spelter was 135,497 tons, an increase of more than 12,000 tons over the half of 1910, but about the same as in half of 1909.

The average price of spelter at St. Louis for the period was 5.36 cents per pound, the London average being .2 cent less per pound. During the latter part of May and the first part of June the average London price was about .1 cent higher than the corresponding St. Louis prices. Under this stimulus the May exports of spelter, zinc ore, and dross were largely increased over those of the preceding months.

MANGANESE BRONZE—AN HISTORICAL SKETCH

By Jesse L. Jones.

The following sketch is an attempt to outline the development of manganese bronze in the United States to classify the various brands and to summarize the most important advances that have been made recently in the manufacture of this alloy. Gun metal (copper 90, tin 10) was the immediate forerunner of manganese bronze and the high tensile bronzes. A tensile strength of 40,000 to 50,000 lbs. per sq. in. can be obtained from this mixture if it is properly handled, but this proved inadequate to meet many engineering demands, and hence the need of a stronger alloy. P. M. Parsons, of London, England, discovered that gun metal was improved in strength by the addition of manganese, and there was granted to him British Patent No. 842, February 7, 1876, for the adding of ferro-manganese to alloys of copper and tin or zinc, or both.



JESSE L. JONES.

The copper-zinc alloy referred to in this patent was practically the same thing as Thurston's maximum copper, tin, zinc alloy, but it failed to give satisfactory sound castings, and we find that an additional patent, British Patent No. 11,512, August 9, 1888, was issued to Mr. Parsons, covering the addition of aluminum to the alloy mentioned in the original patent. The presence of aluminum enabled good sand castings to be obtained, and the copper-zinc alloy proved so much superior to the copper-tin alloy that the latter was dropped. A United States patent, No. 206,604, 1878, was taken out by P. M. Parsons, a duplicate of his British Patent No. 842, of 1876, but the other patent does not seem to have been duplicated in the United States for we find that Alfred H. Cowles was granted United States Patent No. 415,832 for the addition of aluminum to alloys of the type under discussion.

Prior to 1890 the firm of B. H. Cramp & Company, of Philadelphia, had done much experimenting with high tensile alloys. Mr. Howard Cramp, of this firm, had introduced iron and manganese into various bronzes by means of ferro-manganese, black oxide of manganese, ferro-cyanide and ferro-cyanide of manganese, etc., and had finally evolved an alloy that was called "Vesuvius Metal." It contained no aluminum, and an average test gave the following result:

Ultimate	47,336	pounds
Yield point	21,289	pounds
Elongation in 2 ins.	28.0%	
Reduction of area	28.8%	

The alloy was not very well suited for sand castings, being really a forging alloy, the following remarkable result being obtained from a test of a rolled flexible turret coupling:

Ultimate	120,320	pounds
Yield point	24,192	pounds
Elongation in 2 ins.	33.5%	
Reduction of area	29.8%	

An analysis of these two, which gave these results, showed:

	Casting.	Forging.
Copper	58.40%	60.00%
Iron	.94%	.70%
Lead	.56%	.60%
Manganese	2.80%	3.20%
Tin	.16%	.20%
Zinc	37.14%	35.60%

Lack of uniformity in the Vesuvius Metal and the difficulty experienced in making it, led the William Cramp & Sons Ship & Engine Building Company, in 1890, to enter into negotiations with the Manganese Bronze and Brass Company, Ltd., of London, England, which controlled the Parson's patents, and in 1893 the exclusive rights for making Parsons' manganese bronze and other alloys in the United States were purchased.

The great purity of the copper and zinc obtainable in the United States enabled Wm. Cramp & Sons to make a manganese bronze far superior to that produced in England and secured a steadily increasing market for the alloy. This excellence of quality has been maintained down to the present time, and it is worthy of note that none of the successful brands of manganese bronze now on the market depart very much from the original Parsons' formula.

In 1892 Mr. Jos. Brown, who had been connected with Wm. Cramp & Sons, produced for Paul S. Reeves & Son an improved Vesuvius Metal, a test of which is given below:

Ultimate	55,640
Yield point	22,800
Elongation in 2 ins.	28.0
Reduction of area	28.8

An analysis of this alloy gave:

Aluminum	.16
Copper	57.60
Iron	.63
Lead	.37
Manganese	3.46
Tin	nil.
Zinc	37.78

The addition of aluminum should be noted. This firm has improved, its alloy, which is known as Tubal Bronze, and the manganese content has been considerably reduced, thus rendering the castings made from it less likely to be spongy.

About this time the Bath Iron Works, of Bath, Me., began producing manganese bronze said to be made after the formula used by J. Stone & Co., London, and this brand has attained a high degree of excellence.

In 1901 Mr. Joseph Richards, of Philadelphia, made at the works of Evnon & Evans, of that city, a bronze known as Richards' Bronze. It contained:

Aluminum	1.00
Copper	60.00
Iron	1.00
Zinc	38.00

This alloy was an aluminum brass—in fact, all the so-called manganese bronzes are, strictly speaking, brasses—but it proved a failure because the iron was added as zinc dross, and this being more or less oxidized, lowered the ductility and tensile strength. The aluminum was added to the runner of the casting at first

and later was combined with the zinc as was also the dross, but the alloy never gave more than 50,000 pounds tensile strength and 15 per cent. elongation in sand castings.

The Ajax Metal Company, of Philadelphia, early entered in the manufacture of manganese bronze, its brands being known as Ajax Manganese Bronze. An aluminum brass was made at an early date by the Builders' Iron Foundry, Providence, R. I., and known as Builders' Bronze. Similar alloys were made at the brass foundries of the various navy yards, and they were known as Consol Metal, Reilley's Bronze, etc. The Metallurgical Company, Newcastle-on-Tyne, England, has obtained some very high tensile tests on their K. V. B. manganese bronze. A sample cut from an ingot recently gave the writer the following result:

Ultimate	95,250
Yield point	54,750
Elastic limit	34,000
Elongation in 2 ins	19.0%
Reduction of area	20.5%

A number of American firms make special high-grade varieties of manganese bronze that approximate the above figures not only in the ingot, but also in sand castings, but the writer has found that a 75,000 ultimate bronze has a more general application than a 90,000 ultimate bronze; it gives cleaner castings and is easier to handle in the foundry. The changes in the composition of the different brands of manganese bronze forms a condensed history of the development of the manganese bronze industry and the table below gives a number of analyses of typical brands:

	Al.	Cu.	Fe.	Pb.	Mn.	Sn.	Zn.
1.....	nil.	58.40	.94	.36	2.80	.16	37.14
2.....	.16	57.60	.63	.37	3.46	nil.	37.78
3.....	1.06	55.90	1.71	.03	.65	nil.	40.65
4.....	.16	57.72	1.04	.13	nil.	1.14	39.84
5.....	.20	56.48	1.20	.02	.11	1.15	40.84
6.....	.85	56.05	1.40	tr.	nil.	1.57	40.13
7.....	3.68	66.52	1.58	tr.	tr.	.60	27.62
8.....	.42	54.23	1.40	.34	.44	.31	42.86
9.....	1.00	60.00	1.00	...	...	...	38.00
10.....	.59	61.35	.39	.94	1.12	.75	34.91
11.....	.10	59.37	1.50	.68	.29	.44	37.62
12.....	tr.	59.60	.31	.78	nil.	.59	38.72
13.....	...	53.32	.72	.48	2.74	...	.....

1. Vesuvius Metal, Wm. Cramp & Sons, 1891.
2. Tubal Bronze, Paul S. Reeves & Son, 1892.
3. Tubal Bronze, Paul S. Reeves & Son, 1901.
4. Parsons' Manganese Bronze, Manganese Bronze & Brass Co., England, 1892.
5. Parsons' Manganese Bronze, Wm. Cramp & Sons, 1893.
6. Hyde Manganese Bronze, Bath Iron Works, 1896.
7. Hyde Manganese Bronze, Bath Iron Works, 1896.
8. Hyde Manganese Bronze, Bath Iron Works, 1896.
9. Richards' Bronze, Eynon & Evans, Philadelphia, 1911.
10. Ajax Manganese Bronze, Ajax Metal Co., Philadelphia, 1901.
11. From Vickers, Maxim & Co., England.
12. Consol Metal, Propeller Blade, U. S. S. Olympic, 1902.
13. K. V. B. Manganese Bronze, The Metallurgical Co., England, 1910.

While there is not a wide variation in the formulas used by different makers, the writer suggests the following classification of the different brands of manganese bronze:

1. Low manganese, low aluminum brands, viz.: Parsons' Manganese Bronze No. 2, Spares' Manganese Bronze, Nassau Smelting & Refining Company, Bethlehem Steel Company, Whitlock Coil Pipe Company, etc. These have an ultimate of from 65,000 to 75,000.

2. Medium manganese, medium aluminum brands, viz.: Stones' Manganese Bronze, Tubal Bronze, Ajax Bronze, Hyde Bronze, Exter Machine Company, Lumen Bearing Company, etc. These have an ultimate of from 75,000 to 85,000.

3. High manganese or high aluminum, or both, and no iron or iron incidental, viz.: The Metallurgical Company, Electric Smelting & Aluminum Company and the so-called high-grade, high-tensile strength brands produced by nearly every manufacturer. These have an ultimate from 85,000 to 95,000.

The most recent advances in the technology of manganese bronze are the utilization of the turnings and the securing of greater uniformity in the ingot metal. It has been customary to sell manganese bronze turnings at the price of their copper content, because of the high loss in melting them, and the inferior quality of the ingot produced. A number of firms have perfected means of melting these turnings with a minimum loss and a resulting ingot that is equal or superior to virgin ingot of the same brand. Two heats of turnings recently run down gave the following results:

	Heat No. 1.	Heat No. 2.
Ultimate	82,500 lbs. per sq. in.	73,000 lbs. per sq. in.
Yield point	45,500 lbs. per sq. in.	40,000 lbs. per sq. in.
Elongation in 2"...	14.5%	35.8%
Reduction of area.	17.3%	45.2%
Weight of heat....	6,623 pounds.	10,000 pounds.

In making ingot manganese bronze it has been customary for all makers, without exception, to use crucibles holding about 325 pounds, and no two crucibles would ever give metal of exactly the same quality while imperfect mixing is very common, because with the use of crucibles stirring cannot be easily done, and it is impracticable to pole the metal. Hence it is almost impossible to frame an adequate specification for testing large shipments of manganese bronze, 100,000-pound lots, for instance, without a heavy expense for testing. By using the Schwartz furnace it is possible to make heats of from 10,000 to 20,000 pounds, and there is no practical difference in quality between the first and last ingot from the furnace. The bath is deep enough for thorough poling, so that metal of uniform composition is obtained. It would require 30 crucibles, containing 325 pounds each, to produce as much metal as a Schwartz furnace holding 10,000 pounds, and the amount of surface of the molten metal exposed to oxidation in the crucibles is much greater in the use of the crucible than in the use of the Schwartz furnace.

NEW MALLEABLE COPPER ALLOY.

Among the various malleable copper alloys, such as Munz metal, Eich metal and "sterro-metal," which are on the market, there is one called "Ogala metal," which seems to have many excellent properties in the line of malleability and ease of casting. At red-heat it is highly malleable, is very hard and tough, but affords no difficulties in working. Its hardness and toughness increase up to a certain degree, the longer it is worked under the hammer or in the rolls. In a red-hot state it may be rolled to the thinnest sheets. A great advantage is its low specific gravity. Its melting point lies between 950 degs. and 1,000 degs. C.=1,742 degs. and 1,832 degs. F. Its shrinkage in casting is but slight—about 0.2 per cent to 1 per cent. When care is used, it may be cast with success. It is melted in graphite crucibles and poured when quite hot, but should not be overheated. During the melting process it should be well stirred; and in order to prevent loss in melting should be covered with charcoal powder. It is made by Louis Ebbinghaus in Hohenlimburg, Westphalia.

THE ORIGIN, MANUFACTURE AND BEAUTY OF TIN

By James Scott.

UTILITY OF TIN.

The utility of tin is so universal that a widespread interest must exist concerning its origin and the methods of its manufacture. Before we go any further we ought to correct the impression that a sheet of tin, or a can of any kind, is composed only of that metal. A tinplate, for instance, from which various articles are made, is really a thin plate of wrought iron or mild steel that has been immersed in a bath of molten, and therefore liquid, tin. Both sides of the plate are thereby covered with an adherent film of tin, to the extent of 2 to 3 per cent., as a protection against corrosion. Generally, the plate is dipped in fat before entering the molten tin.

It is, of course, very well known that iron and steel exposed to damp air become rusty—that is, oxidized. On the other hand, tin is practically unaffected under the same conditions. The fact needs emphasizing, however, that owing to tin being electro-negative to iron, the latter (when coated with the former) rusts at a more rapid rate, when the tin is worn off, than does naked iron. Tin by itself would be too brittle for general use; so that the middle layer of iron between the two surfaces of a tinplate is not introduced for deceitful purposes, but as a strengthener. A certain amount of lead is mixed with the tin to reduce its characteristic weakness. Less lead enters into the composition of plates intended for the shaping of cans to hold preserved foods such as salmon, condensed milk, fruit, and so on. A plate made with a view of being utilized for goods that do not ferment or rot, but remain dry, has a larger portion of lead mixed with it, and is then called a terneplate. It should be much cheaper than the others.

DERIVATION OF TIN.

Tin is derived from a hard, strong ore, either dark gray, blackish, or brownish in color. My specimens look like deep-hued lumps picked up from a macadam roadway. The material is called tinstone, also black tin and cassiterite. Huge quantities are obtained from Cornwall, which is practically the only place (or at any rate the chief one) distributing it in this country. The art of tin extraction has been known since the time of the Romans. Sometimes the ore is found in shining masses of black, tetragonal crystals, and also occurs as pebbles in the sandy beds of various streams, the pebbles being simply chunks of the stone from which the irregular corners have been worn by the action of the onward-moving water. Quarries in Australia and Argentine, besides districts of minor importance, now supply a lot of the substance. The ore or stone is a mixture of native tin, quartz, iron, sulphur, arsenic, and wolfram, the latter being known in some quarters as tungsten. Wolfram, by the way, is really a tungstate of iron.

EXTRACTING THE TIN.

The ore, after being broken into small-sized pieces, is crushed to a fine powder and spread over curious tables or platforms which "shake" it, and thereby get rid of some of the heavier grains of quartz. The powder is then washed several times in streams or ponds—i. e., dressed—so that large amounts of impurities are either deposited, suspended, or dissolved out. The cleansed substance, after being dried, is carried on moving belts or floors beneath or through a magnetic apparatus, which draws out the particles of iron. A stronger current afterwards draws out the wolfram and allows the tin and remaining quartz to pass on unaffected. The refined powder is next smelted with powdered anthracite coal, the carbon of which displaces the tin. The latter is subsequently drawn off in a liquefied state by means of a tap, and is remelted later on to free it from various impurities still left—a process called liquation. Sometimes the molten tin is vigorously stirred with long, green poles, when the objectionable gases are forced to the surface and removed therefrom. The roasting in the calciner is intended to volatilize the sulphur and oxidize the iron. It may occur before the other processes, but

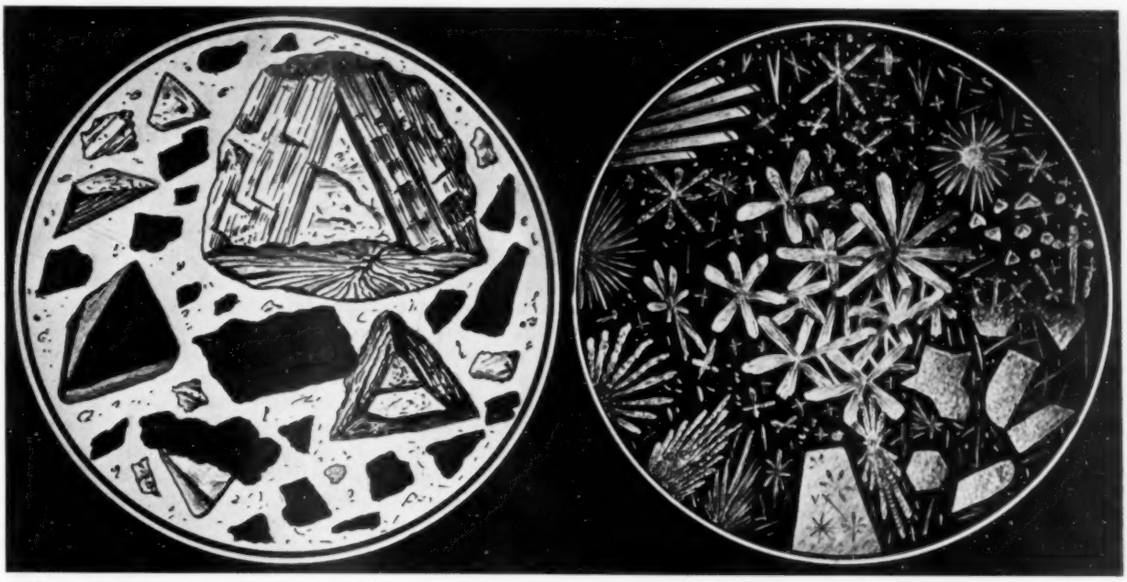


FIG. 1. FINE TIN CRYSTALS SEEN UNDER THE MICROSCOPE.

FIG. 2. CRYSTALLINE FIGURES FORMED BY TREATING TIN WITH HYDROCHLORIC ACID, VIEWED THROUGH A PIN-POINT HOLE.

the usual order of procedure is grinding, washing, roasting, smelting and refining.

CHARACTERISTICS OF TIN.

Tin is, scientifically considered, a very remarkable substance as I will prove later on. Technically speaking, tin is a silvery white, very malleable, ductile, and highly crystalline metal. It melts at a temperature of 232 deg. to 235 deg. C., and boils when the heat reaches 500 deg. C. It is a bad conductor of electricity. The scientific names of tin and its compounds emanate from the Latin word stannum, hence the symbol Sn. 119.0 for tin, and Sn. O_2 for tinstone. The powders already referred to—the various stages of crushed ore—have very characteristic appearances. The first specimen, consisting of the whole constituents of the stone, is a sparkling dust very strongly resembling that which could be produced by mixing together *very finely pulverized* sand, sugar, charcoal, and glass. The burnt material has the appearance of tea dust, still glistening with minute, glassy-looking particles. When the tin and quartz alone remain

FIG. 3. FIGURES PRODUCED BY TREATING TIN WITH POTASSIUM CARBONATE AND "AQUA REGIA."

the powder resembles tea dust sprinkled with cocoa. All these substances are interesting under the microscope. As an example I depict in No. 1 a selection of tiny particles from the original crushed stone. Some of them are semi-transparent, others densely opaque, and the remainder translucent brown, etc.

SOME ALLOYS AND COMPOUNDS OF TIN.

Gun metal is composed of 9 parts of copper with 1 part of tin, while bell metal has 5 parts of copper and 1 part of tin. Fine solder is prepared with 2 parts of tin and 1 part of lead, and coarse solder with 1 part of tin and 2 parts of lead. An alloy of tin and mercury is used for silvering mirrors. Bronze consists of a mixture of tin, copper, and lead or zinc. Pewter and britannia metal are alloys of tin and lead. The well-known polish called putty powder is a peroxide of tin, and is also called stannic oxide and stannic anhydride. It is obtainable by heating tin on charcoal in the outer flame of a blow-pipe, when the metal gets covered with a film of yellow powder which becomes white upon cooling. The brilliant gold-bronze powder so widely sold is made by heating a mixture of stannous sulphide, sulphur, and sal-ammoniac. Gold powder can also be made by subliming tin, sulphur, and ammonium chloride—making stannic sulphide. The old scientific name for this attractive substance is aurum musicum.

A fuming red liquid may be formed by an admixture of pure tin and chlorine, the latter being a suffocating, yellow gas, combined with soda to make common table salt, viz., chloride of sodium. Chlorine water is generally used. This volatile liquid is called stannic chloride, and is extensively used by dyers, being generally hydrated by the addition of water. Boil fragments of pure tin in strong hydrochloric acid. The treatment will cause hydrogen to escape, and leave behind, in solution, stannous chloride owing to the dissolving of the metal. Upon evaporating the liquid, colorless, transparent crystals, like cubes, or similar objects, will be left behind, each being of a size that will easily fit inside a small pinhole. By putting a small scraping of tin on a glass slide, and pouring over the substance a few drops of hydrochloric acid, which are afterwards heated over a lamp, the tin is dissolved into a whitish film which on magnification is resolved into a multitude of microscopic crystalline figures of the kind shown in No. 2. Various effects can be produced according to the respective quantities of acid and metal used. When the stannous chloride previously mentioned is exposed to the air it becomes milky and is partly changed to stannic chloride. Pure stannic chloride is, as I have elsewhere mentioned, a volatile red liquid or spirit.

A very remarkable experiment may be made by heating a strip of tin on a tripod over a spirit lamp for a minute or so until the thin layer is melted into a grayish oxide, and then suddenly chilled in cold water. Have a couple of saucers ready, one containing a solution of diluted potash—such as the carbonate—and the other diluted *aqua regia,* the latter consisting of nitric acid mixed with from two to four times its amount of hydrochloric acid. Roll pieces of paper into two balls—one for each saucer. Then dry the cooled tin and rub it alternately with the solutions. Within a short time pretty figurings will develop over the surfaces. An idea of these is given in No. 3. Naturally, some practice is necessary to secure the best possible results.

THE CARBONIZING OF TAR.

[From United States Consul Thomas H. Norton, Chemnitz, Germany, on special detail.]

The Aktiebolaget Jöh. Ohlssons Teckniska Fabrik, of Stockholm, has solved the problem of removing the carbon from coal tar. The black color of tar is due to the presence of a large amount of carbon in an extremely finely divided state. It constitutes about one-quarter of the weight of the crude material. As the liquid tar has about the same specific gravity as the solid carbon, the latter remains suspended. The firm in question has succeeded in completely isolating the carbon from the liquid constituents of tar, leaving the latter in the form of a clear, transparent, gold-brown liquid.

The carbon separated by the Ohlsson process is totally different from lampblack in its physical properties and is distinctly of a graphite nature. When pressed into a compact form it furnishes admirable electrodes for arc lighting and also for electrochemical work. It could probably be used with equal advantage in making crucibles, as it possesses marked superiority over retort graphite.

THE FUTURE, PRESENT AND PAST OF ELECTRO-PLATING

By Charles H. Proctor.*

The future of electro-plating like that of other commercial enterprises, will depend upon the progress made in the art by individuals or by the concerted action or co-operation of men who understand the essential details of its chemical, electrical and mechanical requirements. These will be so interwoven as to create the standard of efficiency that will be necessary for the successful electro-plater to attain. Electro-plating is so closely identified with commercial enterprises and progress that to keep in line with such advances will require more careful thinking and studying in the electrical, chemical and commercial manipulations than has fallen to the lot of the foreman plater heretofore. For years the art has remained practically dormant chemically. Very little has been accomplished since the days of Elkington, Becquerel, Heeren, Roseleur, Von Leutchenberg, Neidinger and others whose methods and formulas have remained practically standard up to the present time.

But a new era lies in the future. On every hand it is gratifying to note that electro-chemists and metallurgists, who have devoted the product of their brains to the mining industries for years past, are now turning their thoughts to the greater possibilities of the electro-deposition of metals. Not only of metals on metals, but also on many non-conducting surfaces such as wood, plaster, etc., thus obtaining a finish having the appearance of solid metal, combined with extreme lightness of weight and low cost of production. New fields are constantly being opened up for the intelligent workman, so that instead of electro-platers being in less demand in the future, it will be found that there will not be sufficient number of thoroughly experienced men to draw upon to fill the positions that will be created by new enterprises. So it behooves the younger generation, who expect to take up the art of electro-plating in the future to make a thorough study of chemistry and electricity. Adding to these arts such mechanical skill as he possesses, the plater of the future will then be able, with his superior knowledge, to successfully cope with any difficulty that may present itself.

The present of electro-plating is upon a satisfactory basis, so much has been accomplished in a mechanical way in the past decade. Mechanical plating tanks and barrels of almost endless variety have been put on the market. Mechanical polishing and burnishing methods, that brought forth economical results in manipulations, have saved considerable money in the cost of production, which has heretofore been almost prohibitive in the finishing of small articles. By the application of mechanical electro-plating much has been learned that heretofore has not been thoroughly understood. Constant friction by agitation caused greater internal resistance and necessitated denser solutions and greater voltage, to produce results as satisfactory as those secured from the still solutions formerly employed. Electro galvanizing and mechanical plating requiring greater voltages have brought forth the three-wire system. The dynamo developed for this purpose affords a range of from five to ten volts, making the energy created satisfactory for still solutions requiring up to five volts, and for mechanical solutions needing up to ten volts. Such dynamos are replacing the older types because of their particular advantage in developing the high and low voltages required.

*Expert electro-plater.

The platers of the United States and Canada should feel highly gratified that they have been able to maintain a standard of finishes quite equal, if not superior, to those of any other country. Germany, France and Austria, however, have paid more attention to chemical detail. England has followed the lead of the United States, but pays more attention to the uniformity of deposit. Many finishes are produced in the above countries that are unknown in the United States and vice versa. In the builders' and cabinet hardware industry, the United States surpasses the world in the variety of its finishes and designs.

The introduction of "Trisalyte" for solutions in the United States, by the Roessler & Hasslacher Chemical Company, will prove of much value to the plater. The composition of these tri-salts, being uniform in quality and perfectly balanced, will produce more satisfactory results in the various deposits than has been obtained in the past. Such solutions are prepared for electro-galvanizing, copper, brass, bronze, silver and gold plating. These salts are used exclusively in Germany, and have been on the market there for several years. In France and Germany bright nickeling has been brought to a successful issue. If a polished surface is immersed in the bright nickel bath the deposit will remain bright even though plated for several hours, and will require no further polishing when removed from the bath.

The Sangamo ampere hour meter will no doubt prove of great value in determining the actual amount of metal deposited in a given time, so that eventually a system of costs—so much desired—will be installed in the plating department; and, with the introduction of the Rojas method of electro-chemical metal coloring, the present status of electro-plating can be considered as satisfactory.

The past of electro-plating must always be interwoven with the present and the future. The secret of precipitation has never been satisfactorily explained. The question is often asked, What is electricity? So the plater often wonders what causes those particles of metal to become so evenly distributed over the metal or melatized non-conductive surface, but he cannot explain why. The old myths of unsatisfactory deposits being due to too much sunshine, too much cloudy weather and a hundred and one other imaginative thoughts, have, like the myths of the middle ages, been explained by scientific study of cause and effect. Unfortunately, while many of the old concerns have modernized their mechanical productive departments, they have sadly neglected their plating department. The owners of such plants wonder why they do not produce the same results as their more modernly equipped competitors. In many instances this neglect of introducing modern methods and equipment revert upon the plater to his disadvantage; his employer oftentimes thinking he is not as competent as the plater of a competing concern. Recently I paid a visit to one of these modern plants with a plating room linked with the past. The results being produced were unsatisfactory. Several thousand gallons of solutions, consisting of brass, copper, bronze and nickel, were in daily use. The brass deposit varied greatly in color, and was otherwise inferior. In looking over the plant for the probable cause of this variation in color my attention was immediately drawn to the absence of a volt meter. It is a well-known fact that a uniform deposit from a number of solutions depends not only on the uniformity of the composition of the solutions, but also upon the uniformity of the voltage at the tank terminals; so that unless evenly balanced, the deposit will not be uniform. Variation in voltage produces variation

in color and a variation of internal resistance in the various tanks, and not the incompetency of the plater, is the primary cause of lack of uniformity of deposit.

Give the progressive plater modern methods and he will undoubtedly produce results. This does not only refer to one solution but to the results obtained from any number of solutions in action at the same time. Looking back more than a quarter of a century into the past of plating, one is amused at the ridiculous thoughts and ideas that entered into the mind of the plater as to the probable cause of the troubles he encountered. With the light of the present and that of the future, such delusions will pass away, because science is unalterable, and as we progress we shall understand our vocation more scientifically.

The National Electro-Platers' Association has been of untold mutual advantage to its members, producing results from exchange of thoughts, ideas and experiences. So this association belongs to the present and the future. What is required is a greatly increased membership to accomplish the results desired by the association. If Andrew Carnegie or some other great leader in the metal world could understand its requirements there is no doubt their financial assistance would be forthcoming to maintain the art of electro-plating in this country in the foremost ranks of the world. With a scientifically equipped laboratory and competent men, who are experts in their various lines, the solution of many problems could be accomplished and great results accrue, which would be of advantage not only to the individual plater, but to the country at large.

PHOTO-ENGRAVERS COPPER SHEETS

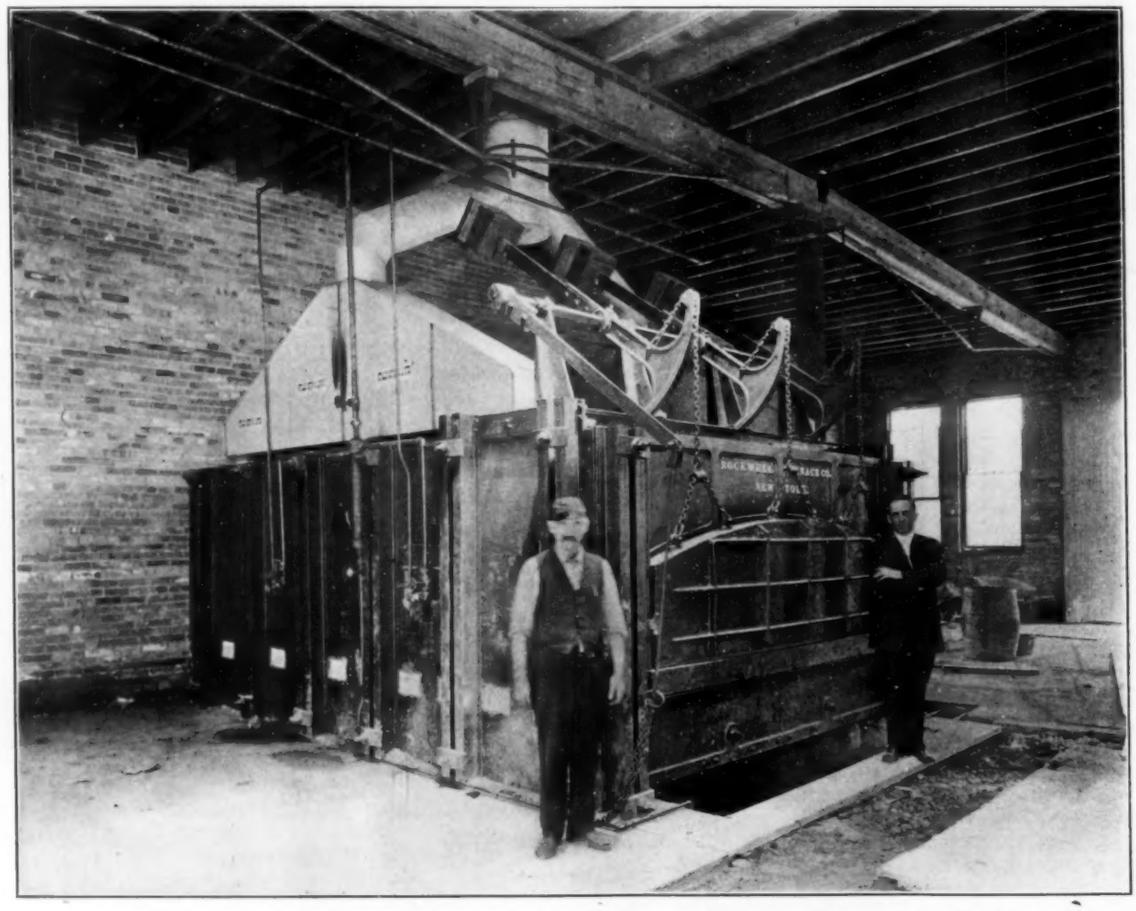
A Description of the Preparation of This Important Material and Some of Its Uses.

By R. A. Wood.

Photo-engravers' copper sheets are used principally for the manufacture of plates such as are used for making the illustrations in newspapers, magazines, periodicals, etc. These sheets must be absolutely flat and have a perfect surface on one side at least. The sheets are tested by holding them to the light in a slightly inclined position and then by getting the eye the proper distance from the sheet any waves or ripples upon the surface may be seen. Should any of these waves or ripples appear in the sheet, the sheet is condemned and either cut up as scrap for the casting shop or rerolled to another size and sold as regular commercial sheet copper.

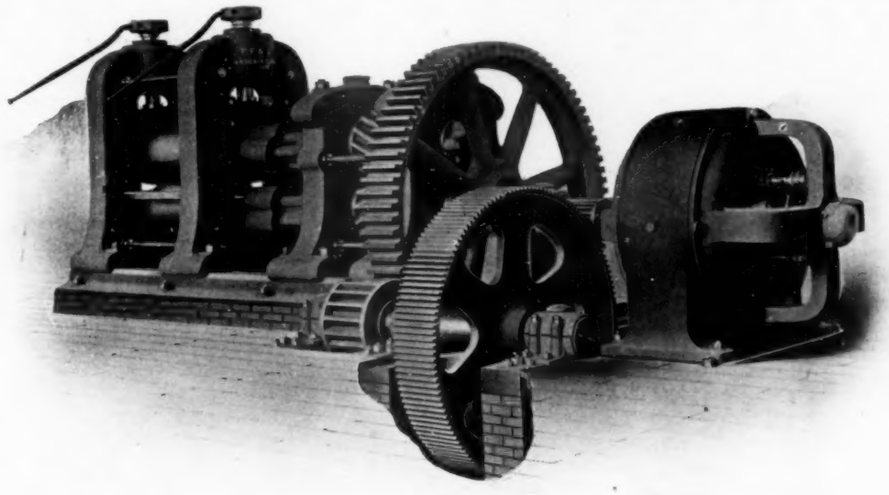
The lake brands of copper are not the most suitable for this class of work, as they are too soft, even when rolled to the point of fatigue.

A good sheet may be made from a brand of copper known as "Basic copper." This copper contains a small percentage of impurities, which make it slightly harder



COPPER ANNEALING FURNACE WITH SCALING PIT. BUILT BY ROCKWELL FURNACE COMPANY, NEW YORK.

than the lake brands, and this "Basic copper," when rolled into sheets from 7 to 9 numbers hard, will make a plate of the proper temper for the test which the photo-engraver gives it. This Basic copper is made in cakes of the usual form and is "broken down" on the hot rolls into bars about 14 inches wide and ¾ inch thick; it is then flattened out on a three or five roll straightening



MOTOR DRIVEN COPPER FINISHING 20 BY 40 INCH ROLLS, MADE BY ANSONIA FARREL FOUNDRY AND MACHINE COMPANY, ANSONIA, CONN.

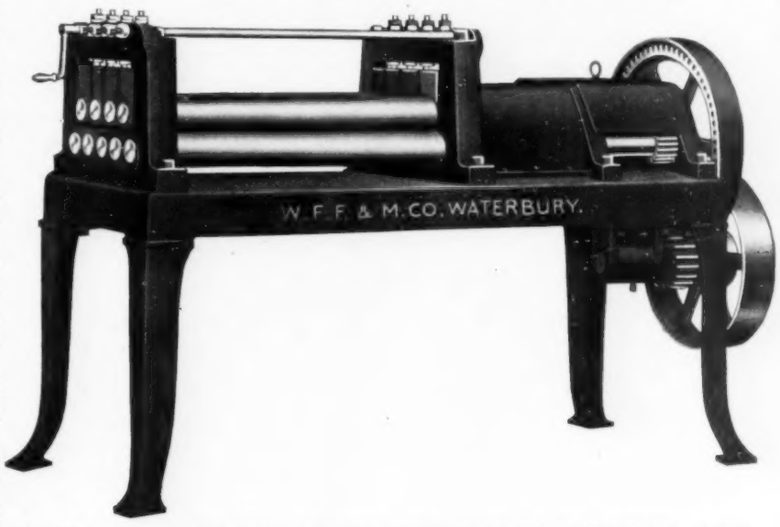
machine and then machine overhauled on the best side of the bar. This operation is done on the regulation brass mill overhauling or scratching machine.

For an illustration of this article we will suppose a batch of sheets to finish 22 x 36 x .049 inches is wanted. The bars after being overhauled are taken to the cold breaking down rolls and rolled to about 5-16 of an inch thick. They are now sent to the muffle to be annealed, after which, while still red hot they are thrown into a tub of water made slightly acid with oil of vitriol. After remaining in this tub about 30 minutes they are taken out, scoured off with brooms, rinsed and put on a wagon and sent to the rolls again to be rolled to .138 inch thick. The bars are now cut up into pieces 22½ inches long and again sent to the muffle to be annealed. After being annealed the sheets are again put into the scaling bath while red hot and are again scoured and rinsed in cold water. They are now put into a hot water bath and left long enough to thoroughly heat the sheets, after which they are taken out and stood upon end to dry.

The sheets now go to the inspecting room and are carefully looked over for any imperfections on the side which has been overhauled. Should any be found they are scratched out with the ordinary hand scratching tool. Great care must be taken not to leave any shavings or chips of metal on the surface of the sheet, as such chips or shavings would be rolled into the copper again and cause pit marks to show on the sheet. The sheets are now brought from the inspecting room to the finishing rolls and rolled crosswise of the sheet to .105 inch. They are again annealed, scaled, rinsed and dried as before, and again taken to the finishing rolls to be rolled to and finished .049 inch. This sheet will be plenty large enough to trim 22 x 36 inches.

The finishing rolls for this class of work are 20-inch diameter, 52-inch face, and turn 22 revolutions per minute. They are specially ground with a crown of only from three to five one-thousandths of an inch, and in the finishing operation each sheet is passed through the rolls from 20 to 30 times. It is absolutely necessary to work the sheet in this way in order to prevent the pinion marks and waves from showing in the finished sheet. The first pinch given to the sheet is generally just enough to make it turn up a little as it leaves the rolls, it is then repassed through the rolls—without coming down on the screws—enough times until it leaves the rolls flat and straight. It is then given another pinch and repassed through the rolls the same as before. This operation is again repeated and so on down to the time the desired thickness is reached. A good roller, who understands his business, can finish a ton of these sheets per day of ten hours.

After the sheets are finished on the rolls they are sent to a 7 or 9 roll flattening machine and passed through these rolls to make them absolutely flat. They are now



3½ BY 32 INCH WIRE ROLL STRAIGHTENER, MADE BY WATERBURY FARREL FOUNDRY AND MACHINE COMPANY, WATERBURY, CONN.

inspected for imperfections and waves and then sent to the squaring shears to be trimmed to size, after which they are packed in boxes holding 500 pounds each and shipped. Some times these sheets are ordered polished on one side. In this case great care must be taken not to overheat the sheet and buckle it while buffing, and the polished surface must be free from marks or drags.

THE WOES OF A PATTERNKEEPER

By W. H. Parry.*

W. H. PARRY.

If there is any one job on the face of the earth that is very apt to produce nervous prostration, paresis or softening of the brain it is that of the patternkeeper of a jobbing iron or brass foundry, or what is really as bad, of a big manufacturing plant that usually sends out a part, or all, of their patterns to either a local foundry or, worse still, one or two out of town. The various methods used to keep track of patterns, such as the card index, loose leaf ledger and just ordinary, plain, everyday books depend after all on the ability of some one man or set of men who know the patterns when they see them, and all the systems devised by mortal man fall down hard when put to the real test. This statement, of course, will be questioned by that army of systematizers now abroad in our country, who will tell you that THEY have a system for keeping track of patterns, no matter what the conditions, which is infallible. Now let us commune together and see just how well these alleged systems work, and then, if possible, suggest some means whereby their difficulties can be lessened somewhat though we never, for a minute, will have nerve enough to claim that ours is the only simon-pure, blown-in-the-bottle method of eradicating ALL the evils that beset the path of the pattern storage man.

PATTERN RECORD SLIP.

TO BE CHECKED BY FOUNDRYMAN ON RECEIPT OF PATTERNS

Pattern Symbol.....	B4-11-44.....
Castings Wanted.....	18 .....
Material	C-I .....
Lot Number.....	7 .....
Pattern or Patterns.....	1 .....
Pattern Parts.....	20 .....
Corebox or Coreboxes.	8 .....
Corebox Parts.....	21 .....
Stock Cores.....	36—1⅜ in. diameter, 8 ins. long...
Patterns Shipped to....	Swiss Cheese Casting Company..
Date of Shipment.....	January 15, 1912.....
Patterns now Stored at..	.....
Rush order.....	Yes .....

Remarks.

.....

The pattern record slip shown here is a fair sample of one sent out with every pattern, and it would appear that every point is covered, so that it would be plain sailing for any man who is owner of a fair-sized intelligence, to keep track of any pattern no matter how many loose pieces and coreboxes may be a part of it. But if the question arises as to some of the parts being missing when received by the patternkeeper, the founder will almost invariably claim that everything was accounted for when it left his place, and he may be honest in his statement at that, as it is the easiest thing imaginable for a loose piece or two or a half a corebox to be lost in transit. Very well, then, who is to blame? The railroad, say you, or possibly the truckman, especially if he is not connected directly with the foundry, again we say, very well, what are you going to do about it? Go to the railroad people and demand satisfaction? Nix on that stuff, as it does not pay, and we might say the same if you tackle the boss truckman, so you just say a few things under your breath and trust that you may have better luck next time.

Now for remedy No. 1: Paint or varnish your pattern with colors that you would know at a glance and let them be of a shade not commonly used (I know of one concern that uses green varnish on the body of their patterns with beautiful heliotrope colored core-prints), and where the loose pieces are to be located, use still another shade and cover the part of the loose piece; that meets the pattern, with the same shade. This will show where the loose pieces belong, at least, and when the foundry people are getting your patterns ready to be returned they ought to be able, without the aid of a sixty-horsepower telescope, to know how many loose pieces there are on the pattern. The argument may be advanced that to keep the pattern in proper condition, so that these patches can be seen would mean extra expense, and there is something in that, but I will venture to say that the cost of the necessary up-keep would be less in the long run than would the expense of making new loose pieces continually.

Remedy No. 2: Assuming that there are nineteen loose pieces on a pattern, and when the pattern is returned you find but fourteen. You notify the foundryman and in a week or so he returns three of them, leaving you still two minus. Do you make these two pieces the next time you send the pattern to him? Not so, Rudolph, you send him a blue print with the pattern, showing where the two missing loose pieces ought to be and HE does the replacing of missing parts, for you have notified him in the meantime that if the casting should be delivered at your works minus the lugs, feet or bosses, as formed by the loose pieces NOT RETURNED, the casting will be rejected. This you will find is the most effective way of getting all the loose pieces "that's a-coming to you," with an odd half corebox or two thrown in. Of course, it cannot be claimed that this method is fair to the foundryman, as the pieces may have been lost in transit, but in an experience covering more years than I care to acknowledge, I have found this to be a successful means of eliminating about all the troubles incident to the loss of loose pieces, and I know of at least one patternkeeper who practices this little game so successfully that his sleep is not broken by the frightful nightmares that afflict about ninety-nine per cent. of patternkeepers.

*Superintendent, National Meter Company, Brooklyn, N. Y.

PRODUCTION OF ALUMINUM IN NORWAY.

One large factory at Christiansand is devoted to the electrolytic production of aluminum. The process is practically identical with that employed in the large American works. The export of the metal was 486 metric tons in 1909 and 1,019 tons in 1910. This is equivalent to one-ninth of the annual American production.

A FEW SUGGESTIONS ON TURRET LATHE PRACTICE IN THE MANUFACTURE OF BRASS GOODS

By Ernest Dietz.

(Continued from December, 1911.)

Internal and external thread-cutting operations may be divided into two classes. In the first class the thread is produced either by a single point tool or a chaser of the proper pitch, guided either by hand or by a properly geared lead screw on the machine. This method is used particularly on large work, where the size makes taps or dies impracticable or where the quantity of the work produced does not justify the expense of these tools. The dies used for external thread cutting may be purchased or made in several different designs. The round adjustable die is made to cut practically all sizes from 1-16 inch to 1¼ inch, the diameter of the die itself varying from ⅝ inch to 2½ inches. These dies are slotted on one side and may be adjusted as to size to a limited extent by means of a small screw.

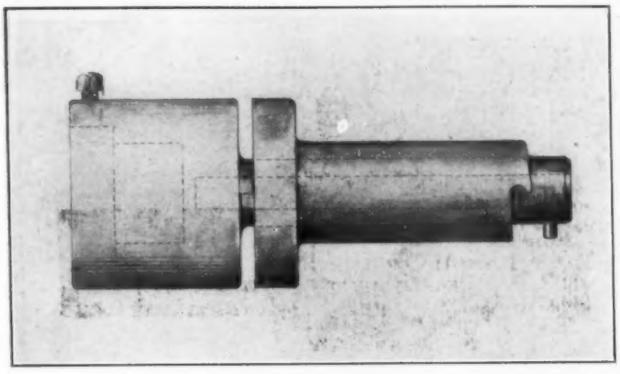


FIG. 1. AUTOMATIC RELEASING DIE HOLDER.

Another type of die frequently used on brass work is the spring or finger die. This die is provided with a clamping collar by means of which a slight adjustment in the size may be obtained. It has this advantage over the round die, that it may be ground readily when dull on an emery wheel. In order to use both of these types of dies to best advantage they should be fitted with a holder which automatically releases the die or, in other words, allows the die to revolve with the work when the desired length of thread has been cut. A die holder of this type is shown in Fig. 1 while in Fig. 2 appears a sectional view of the same holder showing the construction of the parts. A is the head of the die holder bored out to fit the dies as shown at B. E is the shank which is fitted into the turret holes. F shows the stem of the body which should be a good running fit in the shank E. D in the sectional view shows the clutch pins disengaged. They appear in the proper position for threading in Fig. 2.

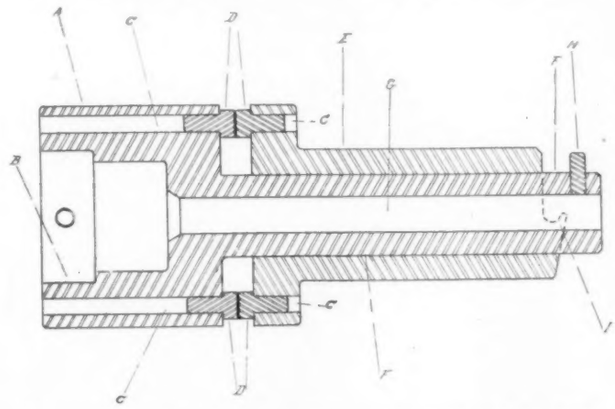


FIG. 2. SECTIONAL VIEW OF THE AUTOMATIC DIE HOLDER.

The disengagement of the clutch pins is effected automatically by adjusting the corresponding slide stop of the turret so that the clutch pins release when the desired length of thread has been cut. The die and the head of the die holder will now revolve with the work, the stem of the head turning in the shank E until the machine is reversed. The withdrawing of the turret automatically brings the pin H into engagement with stop I in the shank E, which prevents the rotating of the die holder in the opposite direction and causes the die to back away from the work. Some minor constructional details shown in the sectional view Fig. 2 are the holes C, both in the head of the die holder and the flange part of the shank. These holes allow the clutch pins to be driven out easily should it be necessary to renew or repair them. The stem of the head may also be drilled clear through, to allow long work to pass through the shank. It is also desirable to have a large hole, or several smaller ones drilled into the head of the die holder back of the recess for the die to afford a means of readily removing the chips.

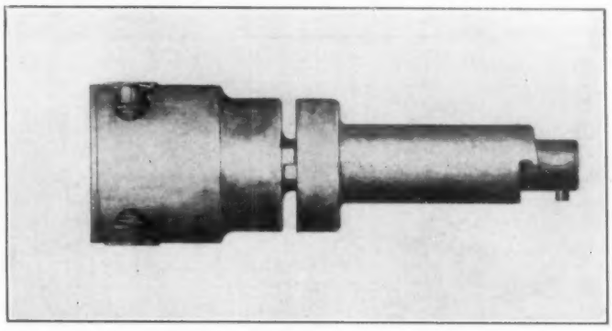


FIG. 3. ADJUSTABLE TAP HOLDER, ADAPTED FOR SEVERAL SIZES OF TAPS.

The same features are used in the adjustable tap holder shown in Fig. 3. The head consists of a drill chuck adapted to hold several sizes of taps and the shank contains the realeasing and reversing mechanism as shown in the die holder Fig. 1. The setting and operation of this tool are also similar to the method decribed above.

All of the foregoing holders necessitate the reversing of the machine in order to run the tap or die from the work, after the thread has been cut. This is objectionable for several reasons, principally the loss of time and waste of power caused by stopping and reversing the machine twice for each threading operation, and the danger of injuring the thread or the die by running it back over the work at high speed. This led to the design of the self-opening die head and the collapsing tap for use in place of the round dies and solid taps.

The self-opening die head consists of the chasers and the head, the head contains the mechanism for opening the chasers radially when the desired length of thread has

been cut, and for returning them to the original setting again for the next piece, either automatically or by hand. The opening of the chasers is performed by means of a cam plate fastened to the stationary or shank part of the die head. When the travel of the turret slide is stopped the forward part of the head carrying the chasers is released and allowed to turn through a small part of a revolution with the work. This movement of the forward part of the head in relation to the stationary shank end of it opens the chasers sufficiently to allow them to pass over the thread just completed. By means of the small handle

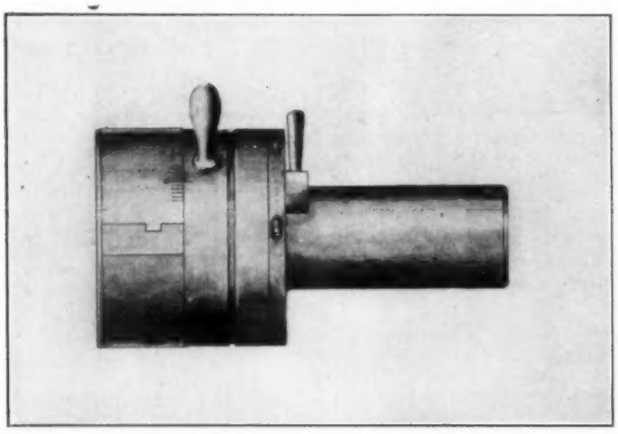


FIG. 4. SHOWING SMALL HANDLE FOR RETURNING CHASERS TO ORIGINAL SETTING.

shown on the forward part of the die head in Fig. 4 the chasers may be returned to the original setting for the next piece, after the die is clear of the work. It is also possible to perform this resetting automatically by the revolving of the turret. In that case a pin is fitted to the die head opposite the handle shown, which engages

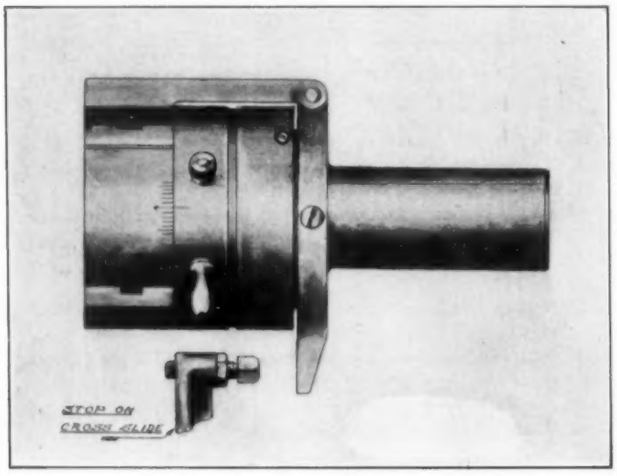


FIG. 5. SELF-OPENING HEAD WITH OUTSIDE TRIP.

into a stationary strip fastened to the turret slide. An adjustment for size is provided by means of which the diameter of the threaded work may be varied for tight and loose fits as may be desired.

On the larger sizes another attachment may be had which gives two settings for the chasers, allowing a roughing and a finishing cut to be taken over the piece. Fig. 5 shows a self-opening die head with an outside trip. Where very short threads of fine pitch are to be cut this die head is to be preferred because the pull necessary to operate the opening mechanism is not effected by the thread, being cut, but by a stop screw and a bracket fastened to the cross slide. The collapsing tap shown in Fig. 6 is designed to take the place of solid taps of ⅞ or 1 in. diameter and larger. As with the self-opening die head it is not necessary to reverse the machine to back out. The adjustable gauge shown in the illustration is set for the desired depth of thread. When this gauge comes in contact with the face of the work the chasers are collapsed. The taps are adjustable for tight and loose fits like the dies and in general their mechanism and operation are the same. Die heads and taps are made so as to cover a range of sizes by using different sets of

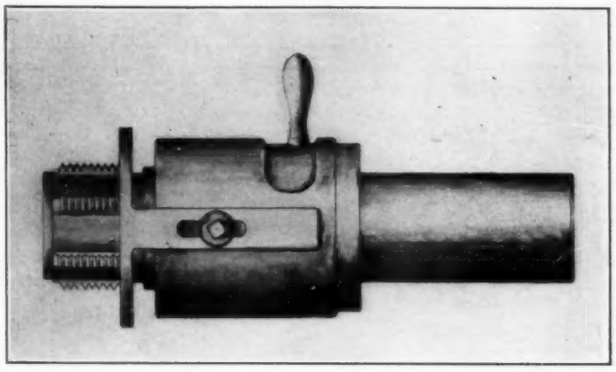


FIG. 6. COLLAPSING TAP TO TAKE THE PLACE OF SOLID TAPS ⅛ TO 1 INCH IN DIAMETER.

chasers. These chasers may be kept in good condition by grinding. Of course the die heads and taps are more expensive than the ordinary tools of this description, but the saving in time alone will usually quickly make up for their larger first cost. In addition to this there is the decreased wear and tear on the belts and countershaft, due to the fact that the machine does not have to be reversed. With these dies all the countershaft pulleys may be used for forward speeds and there is no danger of injuring the threads or the dies backing off.

(To be continued.)

CENSUS OF BRASS AND BRONZE PLANTS.

A preliminary statement of the general results of the thirteenth census taken every five years of establishments engaged in the manufacture of brass and bronze products has been issued by Director Durand of the bureau of the census, department of commerce and labor. The products considered are ingot brass and shapes for remanufacture; rolled sheet brass, bars, rods; brass foundry work and finishing; safety steam appliances; spigots; and brass ware, such as furniture ornaments, stair plates, stair rods, fenders and novelties of all descriptions.

The general summary shows increases in all the items at the census of 1909, as compared with that for 1904. There were 1,021 establishments engaged in the industry in 1909 and 813 in 1904, an increase of 26 per cent. The capital invested as reported in 1909 was $109,319,000, a gain of $31,881,000, or 41 per cent. over $77,438,000 in 1904. The average capital per establishment was approximately, $107,000 in 1909 and $95,000 in 1904.

The value of products was $149,989,000 in 1909 and $102,407,000 in 1904, an increase of $47,582,000, or 46 per cent. The average per establishment was approximately $147,000 in 1909 and $126,000 in 1904. The cost of materials used was $99,228,000 in 1909, as against $65,653,000 in 1904, an increase of $33,575,000, or 51 per cent.

ARTISTIC BRONZES

A Description of the Only Foundry in the United States Employing the "Cire-Perdue" Process of Bronze Casting.

A foundry in which one can find neither flask nor pattern nor sand pile looks like a very queer place to the molder familiar only with the usual methods. Yet such a foundry not only exists but flourishes and gives steady employment to between sixty and seventy men within the boundaries of Greater New York. The Roman Bronze Works at Greenpoint, Brooklyn, N. Y.—about a mile north of the Brooklyn Navy Yard—which turns out some 125 tons of artistic bronze castings per year, makes use of the "Cire-perdue" process exclusively and therefore has no need of flasks, nor of many of the other necessary paraphernalia of the ordinary foundry. The process is not new. In fact, it has been used in Europe for hundreds of years and a crude form of the method was employed by the ancient Greeks and Romans. Benvenuto Cellini, the great bronze worker of Florence, Italy, developed it to the present state about the middle of the sixteenth century. Its use on a large scale was introduced into this country about fourteen years ago by the sole proprietor of the Roman Bronze Works, Ricardo R. Bertelli, and that foundry is the only one in the United States in which the process is now employed.

FIG. 1. ARTILLERY GROUP CAST OF BRONZE FOR GENERAL GRANT MONUMENT AT WASHINGTON, D. C.
The group was cast by the "Cire-Perdue" process at the foundry of the Roman Bronze Works, Ricardo Bertilli, proprietor, Brooklyn, N. Y., October, 1911. The group is 28 feet long, 10 feet wide, 11 feet high, and weighs 28,600 pounds. It is the largest bronze group cast ever erected in America. The architect was Edward Pearce Casey, and the sculptor Henry Merwin Shrady.

The first stage of the process after receiving the model consists in preparing a negative in plaster. This is merely a cast of the outside of the model. From this negative which shows all the details of the model in reverse the wax model is obtained. The wax is first applied in a molten state with a brush, but after the coating has acquired sufficient thickness to protect the most delicate lines the wax is applied in sheets and pressed into shape with the hands. The thickness varies from a quarter to three-fourths of an inch, depending upon the size of the figure. The wax is sufficiently hard to permit handling and can be retouched by the artist as much as he pleases. Gates and vents in the shape of wax rods are then attached to the figure, bronze rods inserted to serve as chaplets and, if necessary, openings cut to permit the core material to flow into the shell. Finally the mold for the metal is formed by pouring in and around the wax a composition, practically liquid, which hardens in a few minutes. This composition can resist a high temperature, and of course all the wax inside will melt away leaving the hollow space which later will be occupied by the bronze.

After baking over a slow fire and cooling the completed mold is packed in sand in a pit, and the metal run in from crucibles. In the foundry of which views are here shown the bronze is melted in the usual crucible furnace fired with coke and coal. An interesting detail in the preparation of the mold is the method employed to ascertain whether all of the wax has been melted out of the mold. A workman takes a hollow tube bent to accommodate itself to the turns in the mold and inserts it as far as he can. He then sucks out some of the air from the inside of the mold. If there is the slightest trace of wax it is detected by the taste! This is crude, but effective; Mr. Bertelli stating that very few accidents ever occur from wax left in the mold.

The molds which remain solid are broken carefully to avoid injury to the castings and the metal figures removed to the finishing room to remove the gates and channels. As the molds are all in one piece very little finishing is necessary and the work being delicate in character, everything is done by hand. Beyond brushing off the particles of adhering composition with a stiff brush the surface requires no attention, except that it is usually treated with chemicals to produce the color or "patina" so much admired by artists.

The plant of the Roman Bronze Works consists of a main building of brick, 100 by 60 feet, used for plaster molding and the finishing of the bronze groups and statues. A frame foundry building, 150 by 90 feet, containing eight crucible furnaces with a capacity of a No 150 crucible each and a small cupola furnace which, however, is seldom used. Here the bronzes, both "Cire-perdue" and sand castings are made and the metal melted for both processes. While the bulk of the work done at the works or about two-thirds of the output is "Cire-perdue," some sand casting is done. Any piece of work that it is desired to reproduce in bronze that has no "undercut-

ting" on it, such as bases, tablets and flat-ware are always cast in sand, because of ease and economy. The third building of the works is used for drying out and melting wax. This building is provided with five pits used for melting out the wax. These pits vary in size, and are generally made to fit the requirements for each figure. Some wonderful pieces of work have been turned out by these works, in addition to remarkable group shown in Fig. 1. Among the notable pieces now in process are a soldier's monument group for the Army Nurses Memorial for Boston, Mass., by Bela Pratt; a statue of George Washington, 10 feet high (standing), to be erected by the American Colony in Mexico, Mexico; a statue of Horace Greeley, 9 feet high (standing), for Chatauqua, New York; one of Andrew Carnegie (seated), for Carnegie Institute, Pittsburgh, Pa.; one of Alexander Hamilton for the Cleveland, Ohio, Court House; one of the Governor Martyr Gobel (standing), for Louisville, Kentucky, and innumerable smaller statues and groups of every description, including the wonderfully artistic, life-like reproduction of Frederic Remington's ideas of western characters.

HINTS ON BRASS FOUNDING

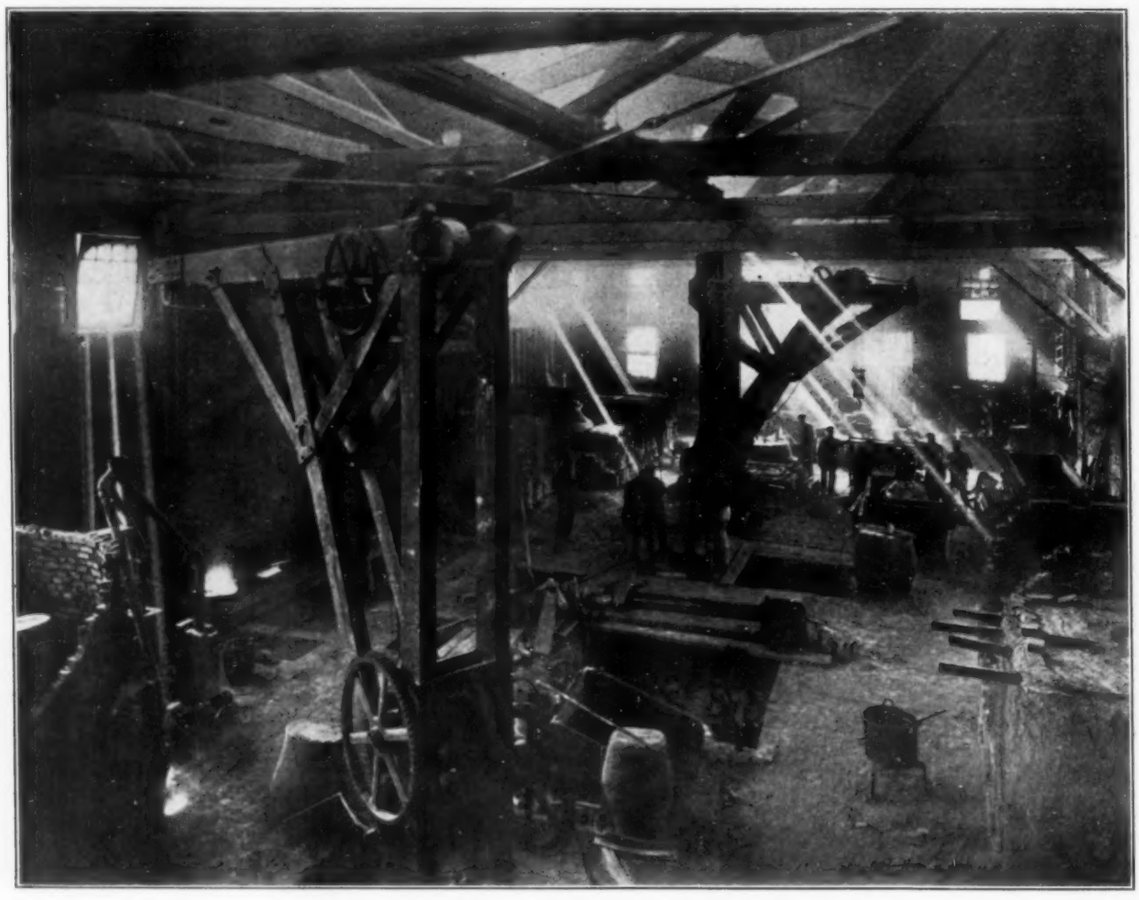
By W. R. Dean.

(Continued from September.)

METALS AND MIXTURES.

For a jobbing brass foundry the following alloys will meet nearly every requirement: (1) manganese bronze; (2) ounce metal—(copper, 17; lead, 1; tin, 1; zinc, 1); (3) government bronze—(copper, 88; tin, 10; zinc, 2); (4) bearing metal; (5) hard bronze; (6) yellow brass; (7) aluminum No. 12—(aluminum, 92; copper, 8); (8) phosphor bronze. Of course other metals will have to be used occasionally, as pure copper, brazing metal, acid metal (used for pulp machinery), yellow brass without and with aluminum, steam metal, valve metal, pattern metal, white metal. But the practice of having several hard bronzes, several bearing metals, etc., is all unnecessary, as a good one of each will answer.

I am going to speak briefly of the different properties of the virgin metals and about melting them before going into the melting and handling the alloys. Copper is the base of most all alloys and its main properties are its ductility and toughness. It is highly malleable and has a great affinity for oxygen, it melts at about 1,900 degs. Fahr. It is a great conductor of heat and electricity. On account of its affinity for oxygen it is hard to get pure copper castings, some deoxidizer has to be used, such as silicon copper or yellow prussiate of potash, a small piece of yellow prussiate of potash (potassium ferrocyanide) dropped into the copper thoroughly stirred and allowed to stand 8 or 10 minutes will give sound castings. It is a very useful metal when alloyed with others, but alone is too soft to wear well and is too close-grained to turn well in the lathe.



FOUNDRY OF ROMAN BRONZE WORKS, BROOKLYN, N. Y.

Zinc, commonly called spelter, melts at a very low temperature, is coarse-grained and crystalline in structure, hard and brittle when cold and malleable when warm. It is white in color with a bluish shade at a red heat, in air it rapidly oxidizes, but at a low heat near the solidifying point it forms a casting somewhat malleable.

The foundry man above the average knows the physical characteristics of copper, zinc, tin, lead, etc., so for the benefit of those who don't I will give a general outline of their properties.

THE COPPER GROUP.

Copper belongs to what is known in chemistry as the copper group of metals, which includes besides copper, mercury, lead and bismuth. Mercury is not used in the brass foundry and bismuth only in making a low melting solder in connection with lead and tin. Copper is the base of alloys used in the brass foundry.

MOLDING THE FIGURES IN THE WAX ROOM OF THE ROMAN BRONZE WORKS, BROOKLYN, N. Y.

There is no need of giving in detail its properties, as the main ones, such as its tenacity, ductility, etc., are known. At red heat it readily unites with oxygen, forming one or both of the oxides known as black and red oxide. These cuprous oxides are soluble in molten copper, making it dry in appearance and brittle in character. This may be remedied by melting the copper and stirring with green wood; care must be taken not to overpole, as the oxygen is then neutralized and the other impurities make the copper brittle. Phosphorus is highly injurious to copper when allowed to remain in it, but a small quantity exerts a refining influence, provided it is nearly all removed by thorough stirring, when it leaves the copper sound.

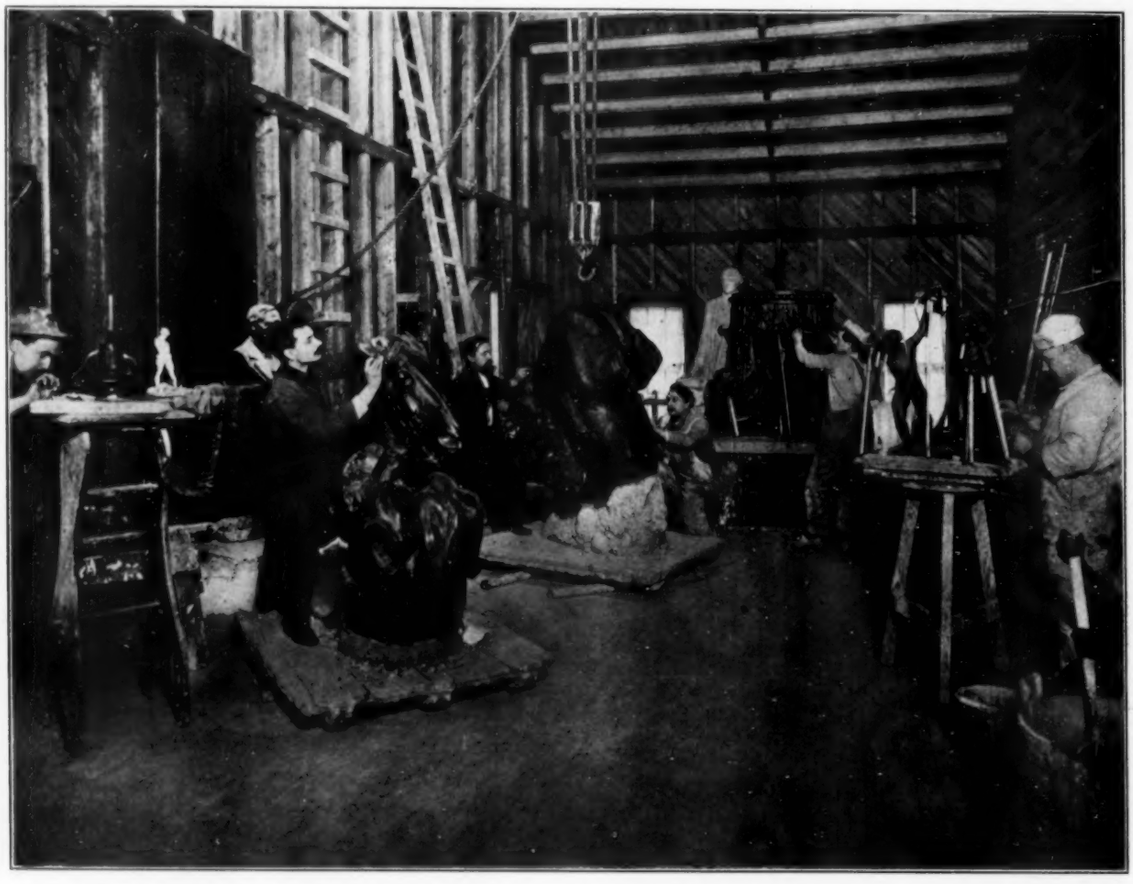
Silicon, when reduced from sand by the action of carbon, unites with copper, making it much harder and causing it to resemble somewhat gun metal, but it diminishes its toughness. Silicon is a good scavenger for alloys. In casting commercially piece copper castings great difficulties are experienced with pinholes caused by the oxide formed in melting the copper. This is overcome by the introduction of a small piece of silicon copper as a deoxidizing agent. A small piece of 10 per cent. or 18 per cent. silicon copper thrown in just before pouring and thoroughly stirred drives off the oxide in the copper bath, and a sound casting results. Yellow prussiate of potash, potassium ferrocyanide, will also give a good, sound casting; a small piece is put in and stirred and allowed to remain about ten minutes when the copper is ready for pouring.

The common impurities of copper are iron, bismuth, arsenic, antimony and coprous oxide; sometimes lead, tin, sulphur, nickel and cobalt.

Still keeping to the copper group, lead next comes as one of the useful and indispensable metals in making alloys for the brass foundry. This metal unites with oxygen readily, as a freshly cut surface shows by becoming black, forming suboxide of lead.

Lead is used in bearing alloys on account of its excellent bearing faculties. It allows a hard surface like that of steel shafting to run easily without heating and tearing. A hard bearing without lead possesses very poor frictional qualities and the shaft would

soon run hard. Lead allows it to run easily, as the frictional coefficient of lead is less than any of the other metals. In bearing metals 10 to 15 per cent. of lead should be added to obtain the best results. Lead does not unite readily with copper, and has to be kept in combination by constant stirring or it will sweat out; above 15 per cent. it cannot be alloyed without the use of sulphur, or tin in 9 per cent solution, with the use of either of these lead can be united up to any per cent. It is only in special cases that an alloy of more than 15 per cent. lead is used, such as in railroad bearings or on heavy bearings reinforced by a copper alloy. Lead in other alloys besides bearing alloys is put in to give free cutting qualities. It is usually added in the proportion of about 3 to 6 per cent.



RETOUCHING THE WAX MODELS AT THE PLANT OF THE ROMAN BRONZE WORKS, BROOKLYN, N. Y.

THE TIN GROUP.

The next group is the tin group, comprising tin, antimony and arsenic. Tin is the most important of these. When it is melted and poured into a mold at a temperature little removed from the point at which it solidifies, the surface remains bright, which signifies its purity. If any foreign substance is present like a little lead or iron, etc., the surface has a dull or frosted appearance. Tin is little affected by air at ordinary temperatures, remaining bright as shown by culinary ware. Commercial tin often contains small portions of lead, iron, copper, arsenic, antimony, bismuth, tungsten, sometimes manganese and zinc. Commercial tin is referred to as common, refined and grain. Banca is the purest, but Straits is the most common.

Tin imparts hardness and toughness to an alloy, and also makes the grain closer. Alloys of copper and tin do not make sound castings without the addition of some deoxidizing agent, tin does not drive out the oxide from the copper, and a copper-tin casting is as porous as a copper casting. Usually a small amount of zinc is added, about 2 per cent. Silicon copper would do just as well. What is known as Government bronze, 88 parts copper, 10 parts tin, and 2 parts zinc is a good alloy showing the result of the addition of tin. This metal has a very close grain, which makes it watertight at a higher pressure than most metals and also makes the alloy tough, sometimes having an elastic limit, when melted under favorable conditions, of 45,000 pounds per square inch, with an elongation of 7 or 8 per cent. This alloy will stand high pressure of water, steam and air. Tin is added to brasses and bronzes to impart toughness and sharpness in running. Most compositions contain from 4 to 8 per cent. tin.

Antimony, the next metal in the tin group, unites with other metals to form alloys in consequence of its hardening properties, but it impairs the malleability and ductility of the malleable metals. It is used mostly in babbitts or alloyed with lead in soft pattern metals.

Arsenic, the next, is not used in the brass foundry, but is sometimes found as an impurity. It is used in shot metal to make it hard and fusible.

THE IRON GROUP.

The next group is the iron group, including besides iron, chromium, manganese, molybdenum, tungsten, nickel, and cobalt. Iron is not used to any extent in the brass foundry except in manganese bronze. It does not unite with the copper alloys readily without the introduction of manganese as a carrier. It imparts hardness and raises the elongation and tensile strength of manganese bronze. Chromium has only lately found a use in the brass industry, a chromium bronze having lately been put on the market. It melts at a higher temperature than platinum, being about sold from 12 cents to 18 cents per pound. One can make the so-called metal scavengers at a good deal less cost than what it can be bought for. One scavenger has brass filings in it to fool the brass founders.

Nickel melts at about the same temperature as iron. It does not oxidize in the air at ordinary temperature as is evidenced by nickel-plated ware, keeping its lustre. Nickel unites readily with other metals, the most important alloy being German silver. It is sometimes used in small amounts to toughen tin bronzes. Cobalt is not used yet, but having the same properties, the opening of vast deposits in Canada may bring it

FINISHING AND ASSEMBLING AT THE PLANT OF THE ROMAN BRONZE WORKS, BROOKLYN, N. Y.

equal to pure manganese. It is usually made up as a hardener, zinc being the metal it is alloyed with. This hardener is then introduced into the copper alloy. It is a comparatively rare metal, but has been used in the manufacturing of steel for some time, chrome-steel being well known.

Manganese is the next metal of the group used in the brass trade, it is used mostly as 80 per cent, ferro-manganese or as black oxide of manganese, hardly ever as the pure. It is used mostly as a deoxidizing agent, except that the 80 per cent. is used as a carrier for the iron in manganese bronze. The black oxide is a very good flux or deoxidizer and is put on the market mixed with borax, salt, brass filings, charcoal, etc., sometimes with only one or two of the above, and sometimes with all of them. This mixture is sold at a fabulous price compared to the cost. Black oxide of manganese costs about 3 cents per pound and borax, charcoal and salt are equally cheap. This mixture is into use. The other metals of this group are not used.

(To be continued.)

BRIQUETTING METALS.

The briquetting of brass, bronze, aluminum, white metal and other metals has not been touched upon, but it may be said that with these melting losses are the same as the solid metal when melted, for in the case of all the softer metals and alloys they are pressed together so closely that they are for all practical purposes sound pieces of metal. The finer the scrap the better the briquette, and hence a magnificent field has been opened for the economical recovery of the expensive metals in the foundry.—Address of Dr. Richard Moldenke before the American Foundrymen's Association, Pittsburg, May 23, 1911. This process of briquetting was described in THE METAL INDUSTRY of January, 1911.

THE MANUFACTURE OF WROUGHT BRASS

A Description of Modern Methods for the Production of Plate, Sheet, Rod, Wire and Tube.

By L. J. Krom.

(Continued from October.)

RODS AND WIRE.

The mixtures of which brass and bronze (?) rod and wire are composed run very close to those employed for sheet brass, given in the January, 1910, number of The Metal Industry. I will here mention only a few of the more common ones. There are practically three classes of brass made in rod form, just as in sheet and plate. These classes are mixtures of copper and spelter without lead; those with lead and those with tin. There are, of course, some special mixtures in use that contain both lead and tin, but these are in a class of made-to-order mixtures and need not be considered as common with the exception of leaded bronze drill rod, which will be treated of later. The more common mixtures then, in everyday use, are as follows:

Copper.	Zinc.	Tin.	Lead.	Use.
58-64	40½-33	...	1½-3	Extruded rods.
61½	37	1½	...	Tobin bronze, naval rod for non-corrosive use, etc.
62	37	1	...	Pin and spring wire.
63-65	35-31	...	2-4	Ordinary leaded brass wire, drill rod stock, etc.
66	34	...	...	Common high brass wire.
68-70	32-30	...	...	Good high brass wire, rivet stock, etc.
80-84	20-16	...	...	Low brass, oreide and gilding.
84-	12	1	2½	Leaded bronze drill rod.

and generally ½ part of iron.

MAKING THE CASTINGS.

Of the above mixtures the only one which offers any difficulty in casting and handling is the leaded bronze. The casting of the bolts and billets for rods is done in precisely the same manner as the casting of slab brass, both drawing and leaded; only an extra man is needed on the casting crew to take the rods out of the mold. The crucible is handled in the same way for good high and low brass rod as for good high and low brass sheet. The leaded and other mixtures are treated a little differently. In view of the fact that the leaded rod bolts are drawn down cold after a few rollings instead of being rolled to finished sizes, the metal must have a somewhat higher tensile strength than sheet metal of the same composition. For this reason and also because of the small cross section of the casting whereby it is difficult to eliminate dirt and dross; there is a smaller latitude in the use of scrap materials allowable than in the case of leaded slab metal. If chips from rods of the same mixture are to be used, not over twenty-five per cent. should be mixed with new material. The best method for using chips or turnings from lead rods is to briquet them and use as a cabbage of sheet brass is used. Failing a briquetting process the chips may be used by judiciously feeding them into molten metal in the crucible, and using liberal quantities of salt with a little sodium carbonate or borax according to the character of the scrap as to dirt, etc. The temperature at which leaded brass rods or bolts should be poured is much higher than for mixtures containing no lead. With a good high heat the metal becomes thinly fluid and the elimination of dross and dirt is facilitated. When the metal is poured into the mold, which should not be warm from previous castings, the cool iron causes a chill and the segregation of the lead is prevented.

As stated before all the precautions given for the melting and casting of flat metal applies with equal force to rods. In fact, there are mills today that make castings for rod and wire by casting a flat slab and then slitting it up and drawing the strip through a round die.

The casting of the leaded bronze rods offers the most difficulty of any copper-zinc-lead-tin combination in the brass business. The physiology of their structure does not yet seem to have been solved. The one feature most sought for in these rods is length, and this it seems to be almost impossible to get. The large amount of lead combined with a high percentage of copper causes abnormal shrinkage, and the rod cracks along its length and finally breaks under subsequent treatment into short pieces. The growing use of rapid fire automatic drill and cutting machinery has created the demand for this particular bronze rod in long pieces. It would be impossible to enumerate the multitudinous methods that have been tried to obtain lead bronze rods in long lengths, say from ten to twelve feet and from one and three-quarter inches in diameter. I have found that the best method to pursue in making this rod mixture, with the minimum loss by shrinkage, is to use enough thirty per cent. manganese copper to ensure one-half of one per cent. manganese acting on the metal. The heat at which these bolts should be poured should be a dull red and just fluid enough to run well in the mold. Best results are obtained by pouring in a cannon mold, but if a box mold must be used, the bands should be knocked down as fast as the metal sets and the mold fills up. A mixture of China clay and lard or whale oil should be used to dress the mold before pouring.

MOLDS FOR BOLTS AND BILLETS.

Castings for rods and wire are called bolts and, in the case of large and heavy ones, billets. The molds used are of the same character as those used for slab brass castings and there are several styles of molds in use. The usual type of mold is the "box," consisting of two parts, the front and back, and held together with wedges and bands just as the "box" molds for sheet metal. The molds are usually made for the smaller sizes of bolts so that two castings are made at the same time. For bolts that are three inches and upwards only one casting is made to a mold. The usual sizes for casting these rod bolts run from one inch to two and seven-eighths inches for two in a mold, and from three inches to six inches for single bolts as are cast for Tobin bronze. The lengths of the bolts vary with their diameter. Rods made in two and seven-eighths inch molds will run about ten feet long and will weigh one hundred pounds each. Naval rod or Tobin bronze mixture, as is now made by one of the large mills runs in the neighborhood of one thousand to fifteen hundred pounds per bolt, and is nearly six inches square.

Or the molds may be of the "cannon" variety, a straight tube of the required inside diameter with a

plug in the bottom, which is easily removed when the metal has been poured in and set, so that the casting can be forced out. These tube molds are usually grouped two and four together and swung on a trunnion at the center so that they can be readily tilted and turned upside down for cleaning and taking out the castings, etc. The cannon mold offers a number of advantages over the old style of box mold, put together in two parts with wedges and bands. One of the chief advantages is the absence of fins or seams caused by the imperfect closing of the mold. Another and very important advantage is less labor in handling and cheaper up-keep as there are no bands and wedges to wear out. The molds for making what is known as "billets" for the extrusion process are either cannon or split molds. The billet itself is generally five to six inches in diameter and eighteen to twenty inches long and weighs around one hundred and eighty pounds. The extrusion mixture, as said before, runs from fifty-eight to sixty-four pounds in copper; one and one-half to three pounds in lead and thirty-three to forty and one-half pounds in spelter to a hundred pounds of mixture. Higher percentages in copper have been tried, but are not satisfactory owing to the higher resistance of the mixture to extrusion.

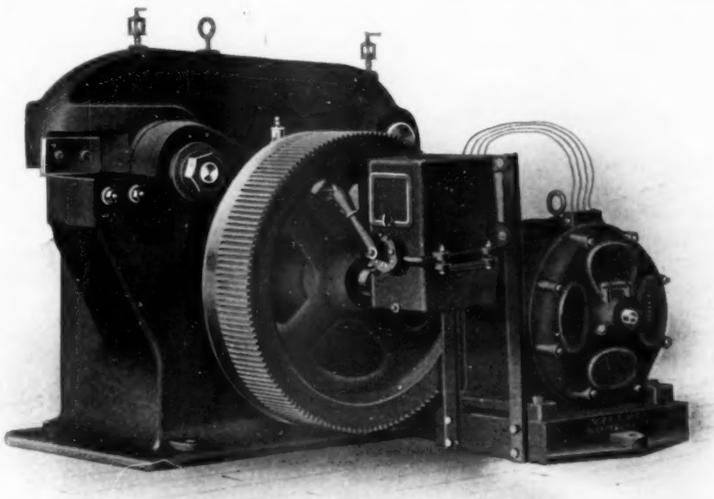


FIG. 31. SHEARS USED FOR CUTTING BOLTS. MADE BY WATERBURY-FARREL FOUNDRY AND MACHINE COMPANY, WATERBURY, CONN.

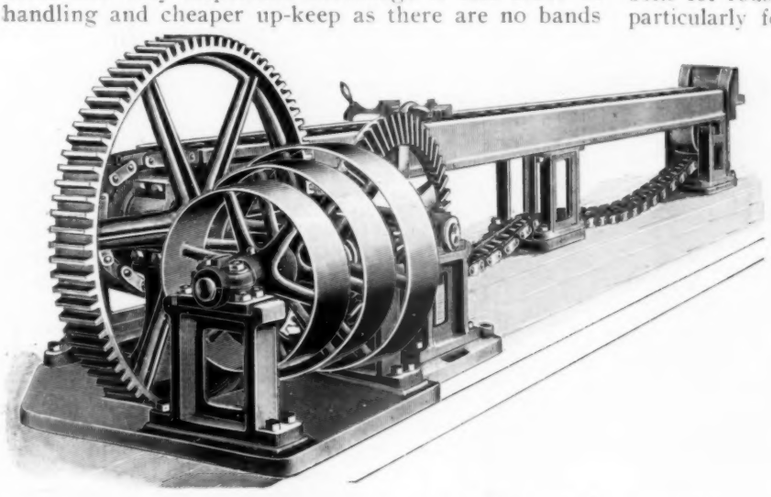


FIG. 32. DRAWBENCH USED FOR "SCALPING" RODS. MADE BY WATERBURY-FARREL FOUNDRY AND MACHINE COMPANY, WATERBURY, CONN.

HANDLING THE CASTINGS.

After the bolts have been cast, if they have been made in a box mold, the fins are filed off on both sides with a heavy cross cut file. If they are made in "cannon" molds this is unnecessary and they go direct to the scales and are weighed. from the scales they go to the shears and the "get" or "gate" end is cut off. The shear may be of the alligator type as was shown in the March, 1910, issue of THE METAL INDUSTRY, used for sheet metal or it may be of the type shown in Fig. 31. From the shears the castings are again taken to the scales and weighed. The caster is then credited with this last weight as "good metal," and the mill is charged with the same amount. Arrived at the mill the leaded bolts are given a "scalping" draw; that is, they are drawn through a sharp edged die on a draw bench as shown in Fig. 32. This process is called scalping and is for the purpose of scraping off all imperfections from the surface and corresponds to "overhauling" of sheet metal. Some mills do not scalp or overhaul their bolts for rods at all, but it is claimed to be bad practice, particularly for leaded stock, as the percentage of bad rods and wire is greatly increased because of flaws and dirt in the surface. The drawing brass, rivet stock, etc., are not drawn through a scalping die, but are sometimes "overhauled" on a sheet metal scraper or are scalped on a machine known as a scalping lathe. This is a lathe with four cutting tools arranged around a center. These tools revolve very fast and cut or chip the surface from the bolt, which is fed through the machine by a screw.

(To be continued.)

ROMAN GOLD.

A good reliable formula for producing Roman gold finish in brass and copper is the following:

Gold	6 dwts.
Yellow Prussiate of Potassium	2 ozs.
Phosphate of Sodium	1 oz.
Carbonate of Sodium	1 oz.
C. P. Cyanide of Potassium	2 ozs.
Water	1 gal.

Dissolve the cyanide in water, and reduce the gold to chloride. Add to the solution and then mix in the separate soda salts. Boil to about 180 degs. Fahr. and allow to stand for twelve hours. Heat to 130 degs. Fahr. Use gold anodes. This solution will produce a fine yellow color and is suitable for jewelry.

"THE SELECTION AND USE OF SCRAP"

A Dissertation Upon English Practice of Handling Scrap Brass and Copper.

By Ernest A. Lewis.*

In the manufacture of brass and copper articles there is of necessity a certain amount of scrap made, this amount should be reduced to as small a proportion as possible for economical reasons. A large amount of scrap returned to the casting shops from sheet or tube mills is a sure sign of bad management, and the return of half finished cast articles to the casters with faults which have shown up in the finishing shops is the same. There is something wrong. It is not always the caster who is to blame. Unsuitable mixing of the metals is often the cause, I refer to the proportions of new metal and scrap, and the use of unsuitable scrap. The scrap out of the mills can easily be used up again, but not so the scrap from dealers. Many tons of scrap from worn out brass and copper tubes, old sheathing, waste from stampings, old wire, old locomotive firebox plates, old castings of various kinds, usually divided into heavy and light, metal from washing ashes, turnings, etc., are bought and sold daily and they come into the works and sometimes cause endless trouble and expense. This can be avoided by judicious mixing and careful analysis. It is quite possible to make brass tubes, rods and sheets to pass any engineering specification (by the way, these specifications in England often specify that only best ingot metals are to be used) from practically all scrap and use no copper ingot at all, only the necessary amount of spelter to make the mixture right and notwithstanding all specifications there is not an analyst or inspector in the world who could tell which was made from all new metal and which from all scrap. To use scrap metal successfully a thorough knowledge of the properties of the various alloys is essential. Scrap arsenical copper makes excellent gun metal castings, but for sheet brass is useless. Scrap must be classified. A good guide for its quality as regards metal for rolling is that thin sheet brass, thin tubes, waste from stampings, wire must be good quality metal or it could not have been rolled and drawn originally.

Scrap may be classified as follows:

1. Copper wire scrap. This may again be divided into two kinds, scrap H.C. wire and telephone wire. Scrap H.C. wire is made of the purest copper and is equal to best selected ingot, and is well suited for all kinds of work. On the other hand, telephone wire contains silicon and the best thing to do with it is to run it down in the copper refinery and turn it into best selected ingot; on no account should scrap telephone wire be used for high-class work. The action of the silicon leads to complications in alloys. It is best to avoid this class of wire altogether in the foundry.

2. Copper tube scrap, firebox scrap, brazed scrap and miscellaneous copper scrap. Here again there are various kinds. Some copper tube scrap is equal to best selected ingot, but the bulk of it in England is arsenical, this remark refers also to firebox scrap. This class of scrap should on no account be used for brass sheets or tubes, or sand castings containing more zinc than tin, the arsenic may practically burn out, but it leaves its effect behind and is not gotten rid of until a second melting. This arsenical copper makes excellent gun metal, the arsenic acts in a similar way to phosphorus, it toughens the gun metal. As many copper tube works buy back their old scrap from users, this class of copper should be refined back again into "Tough" copper and not into Best Selected. I am afraid these terms are probably unknown now-a-days in American practice as good wearing copper is an unknown quantity over there, at least, I should think so, judging by the peculiar ideas of standard copper recently adopted by American makers and users. Brazed copper scrap. This kind of copper if non-arsenical, can be used up in common rolled metal or common castings. Miscellaneous copper scrap is sometimes good, such as stampings from electrical work. Scrap rivets, rails, etc., are usually tough copper, only experience can decide what to do with it.

3. Brass sheet scrap, old brass tube scrap, etc. This class of scrap is generally high-class metal. A test for copper contents is all that is necessary to use it up into good metal. Occasionally it is very dirty and in buying it one has to take into account the scale on it. If this class of scrap is very dirty, it is more economical to melt it down in an open furnace or a large crucible furnace, cast it into small ingots and analyse it. Experienced casters of yellow metal for hot rolling can add the necessary amount of spelter to the metal in the furnace and judge by the fracture when it is the right mixture.

4. Miscellaneous brass sheet and tube scrap. If large quantities of small pieces of tube, stampings, cuttings, etc., are bought, they are best kept separate from large scrap of a similar kind, as they lose a larger amount of spelter than large pieces. They are best used up a few pounds at a time in each heat.

5. Light brass castings are used up in sand castings mixed with a proportion of new metal. It is not advisable to buy this scrap for sheet and tube castings, one can never tell what its mixture is without melting down 2 or 3 cwts., and it is possible it will not do for rolling even if only small quantities are used.

6. Heavy castings are usually made of gun metal mixtures, and, of course, are useless except for sand castings of similar kinds.

7. Nuttings from washing ashes. If it is known from what class of work these come from there is no difficulty in using them up. When they are made in the works they can be used up a little at a time in common metal, or if they contain a relatively large amount of slag, it pays to melt them down, using glass as a flux, and cast into small ingots. The metal comes out beautifully clean and can be tested to find its mixture. The buyers of ashes with a view to washing them sometimes keep gun metal ashes separate from common brass ashes to obtain a better price for the nuttings. A general rule is that nuttings can be used up for similar work to that from which they were made, using a small quantity per heat and avoiding the use of such material where high-grade mixtures are required. Experience only will decide what is the best means of dealing with this material. The remarks regarding nuttings refer equally to clean metal skimmings.

8. Borings. These are now-a-days very often a cause of trouble, one never knows what you get when you buy an average parcel. An accurate analysis is the best test in addition to a careful examination with a magnet. They should be carefully inspected for bits of metallic aluminum and a little sieved through a fine sieve, sometimes a considerable quantity of

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sand may thus be discovered. The purchase of manganese bronze borings or borings containing aluminum (either metallic or alloy) should be avoided by sand casters or makers of ingot for sand casters. Such borings can be used up by yellow metal manufacturers with care, but the price should be sufficiently less than similar borings free from these impurities to allow for the double melting which may be necessary and the consequent double loss of spelter. Notwithstanding its disadvantages it often pays manufacturers of yellow metal to buy this kind of borings, as they can be used up in the furnaces direct, as much as 20% in each heat. Good, clean borings are as good as new metal if they can be relied upon. Among this class of scrap may be included very small pieces of brass made in the course of manufacture from wire, sheet, etc., such metal is of excellent quality. Although this article more directly refers to the English practice, its object is to impress upon manufacturers the necessity of adopting scientific management in every department, and in this it may be equally read by American manufacturers. Another point I wish to emphasize is that, provided enough scrap is obtainable, a brass sheet and tube mill can be run without buying any new metal except spelter to make up the loss in melting, and the metal thus made will be equal in a great many respects to any made from all new metals.

RECENT PROGRESS IN THE RUST PROOFING OF IRON AND STEEL

A Description of Some of the Modern Processes for Treating Steel in Place of Galvanizing.

By Percy S. Brown.

The production of a black finish for iron or steel that would prove both ornamental and give a good degree of protection from corrosion has received the attention of chemists and metallurgists for a good many years. The Bower and Barff processes when combined into what is now known as the Bower-Barff[1] process gave the first commercial black finish that would resist corrosion to any extent. Since that time there have been numerous patents granted for methods of protecting iron or steel from rust through the medium of a black coating, in most cases the protection being due to the magnetic oxide of iron as in the case of the Bower-Barff finish. The methods of producing the black finish are numerous. Among the many processes worthy of mention are the Gesner[2] process which produced a protective coating of iron, hydrogen, and carbon; the Wood[3] process, which produced a protective coating by the action of a hydrocarbon vapor and superheated steam; and the de Meritens[4] process, which produced the black oxide by electrolyzing a bath of distilled water in which the iron under treatment was used as the anode. The two processes which have received the most attention are Bower-Barffing and an old process for protecting iron by the use of the fused potassium nitrate, the latter having been modified and improved by Col. Buffington, of the Watervliet Arsenal, back in the 80's.

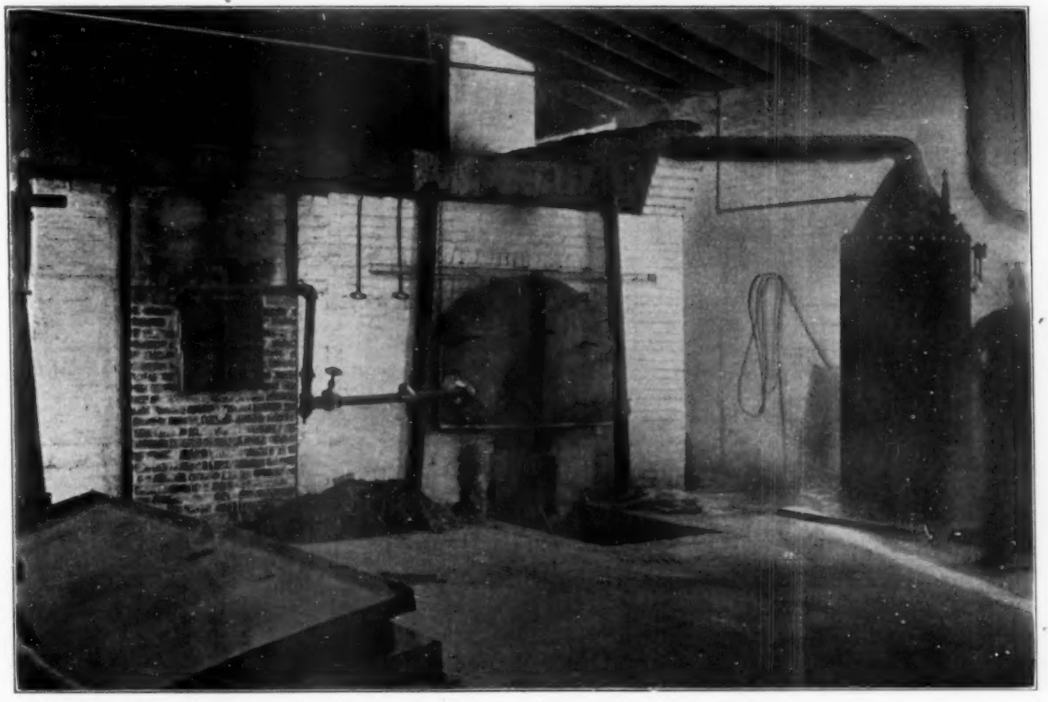


FIG. 1. FURNACE IN WHICH THE BRADLEY PROCESS IS OPERATED.

In 1908 Mr. J. J. Bradley received a patent[5] on a process of producing a back protective coating on iron or steel, this coating consisting of hydrogen and carbon. Mr. Bradley obtained considerable experience in the treatment of iron while associated with Dr. Gesner and the result has been that he now produces commercially iron

or steel parts on which a black protective coating of great value has been applied. The process is not at all complicated and consists in the following operations:

The iron or steel is first prepared in the same manner as for plating, it being necessary to remove grease, rust and scale by sand blasting, cleaning in potash or some equivalent cleaner, or by pickeling in various acid solutions. If a matt effect is desired, and as a rule this finish is preferred for all ornamental work, it is advisable to use the sand blast. Should a bright finish be required, the metal is polished to a high lustre and carefully cleaned before treatment. It is worthy of note that by the Bradley process it is possible to produce a blue black or deep black finish, as shown in Fig. 1, that will have a high lustre and superior rust-resisting qualities. By the ordinary Bower-Barff process the matt finish is produced, and I do not believe that a bright surface can be produced by this process commercially.

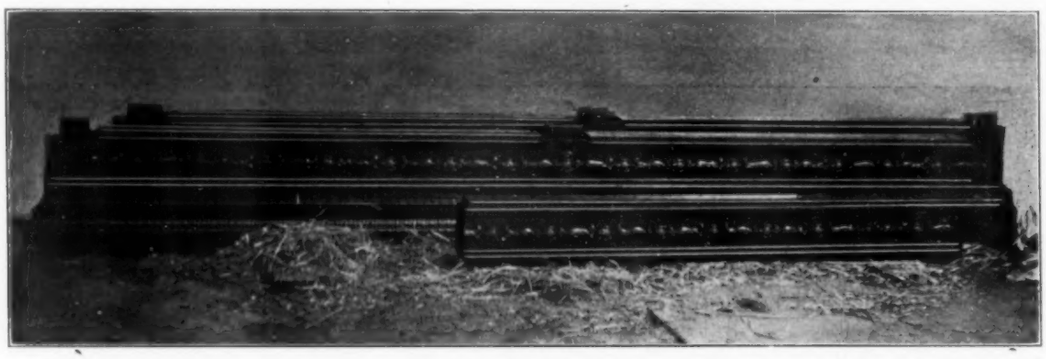
After the material has been properly prepared it is placed on a truck and run into the furnace. The furnace door is then sealed and the treatment begun.

The furnace of the Bradley Rust-Proofing Company, at 35 Ferris St., Brooklyn, N. Y., consists, as shown in Fig. 1, of a muffle, built of firebrick of sufficient size to hold an iron pan about 16 feet long and 4 feet wide, filled with the goods to be treated. The furnace is heated with coal or coke, the firebox being under the floor of the muffle. After the goods are drawn into the furnace, the doors are bricked up tight, so that no air can enter. A jet of hydrogen made by decomposing steam is passed into the muffle and over the goods. A stream of kerosene oil is forced in also and mingles with the hydrogen. The goods become coated with a hydro-carbon of iron which gives them a dark blue color as they come from the furnace.

When the material is removed from the furnace and allowed to become cool it receives a thin coating of linseed oil which brings out the deep black color. In appearance the deposit or coating is very similar to that produced by the Bower-Barff process, but it is different in its physical properties. It is much harder than the ordinary magnetic oxide, and according to one expert who carefully examined the coating it stands very high in the hardness scale, being, I believe, above nine. Examinations that I have made on samples furnished by Mr. Bradley show that the coating is indeed very hard, and that it penetrates to considerable depth. The depth of penetration is regulated by the length of time that the material is under treatment, and can therefore be regulated to suit any material. This is a matter of importance as certain parts should have only a thin coating and others need a very thick coating because of severe conditions that they must meet.

The most important consideration with regard to the process is the ability of the protective coating to resist the action of the elements. The protection of iron and steel against corrosion is one of the most important studies that the present-day engineer has to consider and the Bradley finish is of undoubted value in this respect. The inventor does not claim that his process is a cure-all, but he does claim, and with good reason, that it will do all and more than the old Bower-Barff process will accomplish. I have seen many samples of Bower-Barffed iron and have compared them, only to find that one sample might have good rust-resisting properties and another practically none. This is due to the fact that the process has never been really standardized and the commercial run of work was never uniform. Possibly this is not the fault of the process, but even allowing this point it has been shown by comparative tests that the Bradley finish will resist corrosive action better than the best kind of Bower-Barffed iron.

In addition to the quality of resisting corrosion the property that this finish has of taking a high lustre is of commercial importance. In the early stages of Mr. Bradley's experiments on a commercial scale the author requested him to make up a number of samples that had been carefully polished. The samples were prepared and examination showed that the finish was very smooth, though the lustre was not sufficiently high. The author then tried to buff the samples on a cotton buff with rouge and then with tripoli composition, but was unable to obtain results because the buffing operation had no effect on the coating. After further experiments he found that it was necessary to use a bristle wheel revolving at high speed and feed with flour emery composition. The result was more than satisfactory, as it was unexpected. The parts took a high polish of a deep blue black color, and the surface was smooth and uniform. On making comparative corrosion tests it was found that the polished samples resisted corrosion and abrasion much better than sand blasted samples. It is interesting to note that if polished samples are Bower-Barffed they come out of the furnace with a matt finish that is practically the same as if they had been previously sand blasted. If polishing is then resorted to the coating is either cut through or peels off and a high lustre cannot be produced without removing practically all of the coating and thus sacrificing its rust-resisting qualities.



EXAMPLES OF BRADLEY TREATED CORNICES FOR THE RIKER BUILDING, 80 MAIDEN LANE, NEW YORK.

REFERENCES.

1—A. S. Bower, Trans. Am. Inst. Min. Eng., Vol. 2 (1882), p. 329.
2—Jour., Iron & Steel Inst., 1890 (2), p. 850.
3—U. S. Pat. No. 252,166—1882.
4—Kents Mech. Eng. Pocket Book, p. 388.
5—U. S. Pat. No. 900,655, Oct. 6, 1908.

FOUNDATIONS FOR DROP PRESSES

SOME SUGGESTIONS AS TO THE PROPER INSTALLATION OF HEAVY METAL WORKING MACHINERY, IN TWO PARTS, OF WHICH THIS IS THE SECOND. PART ONE WAS PUBLISHED IN THE METAL INDUSTRY, JANUARY, 1911.

BY GEORGE WILLIAM PECK.*

Among conditions that have caused trouble in setting up drop presses was one in New York City. This drop press had a hammer of 1,200 pounds in weight, had an automatic lifter and was used to stamp up metal ceiling plates. It was set up in a building almost under the Brooklyn Bridge on William Street. The usual timber foundations were used and the anvil was placed in the basement. This building was a part of one used for stores and next to the room in which this machine was placed

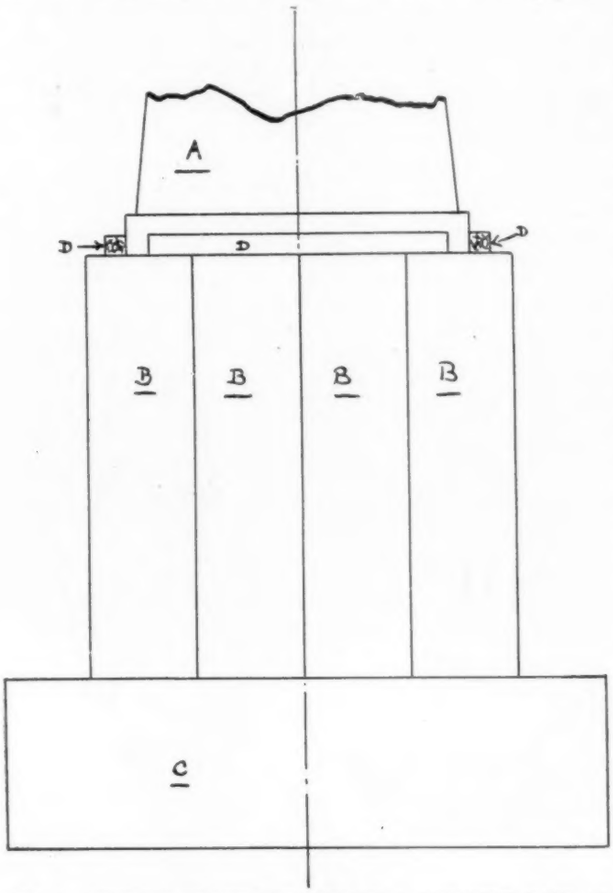


FIG. 1. TIMBERS PLACED ON END ON A CONCRETE BASE AS FOUNDATION FOR A DROP PRESS ANVIL.

was a crockery store. It was not long before complaint was made that the crockery was dancing on the shelves and the machine must be stopped unless it could be operated without jar. On consultation it was decided to set the anvil on something elastic, and it was finally decided to bore large holes under each corner of the anvil, in the top of the timbers, and also make a hole in the center, and place rubber car springs in these holes, having them project above the surface and on them place the anvil. The anvil weighed over five tons but by obtaining large springs they were able to support the anvil above the foundation and the jar was stopped, but the blow was not as satisfactory and the anvil wiggled around so, as they expressed it, that they finally moved to other quarters where the jar did not interfere. Had this anvil been heavier—say nine or ten tons—by placing heavy rubber packing under the anvil, I think the jar would have been entirely overcome.

I was quite interested, a few years ago, in a foundation arranged by one of our customers and which I advised against, but it was a case of an older man considering his theory, rather than the results shown by other experiments. In this case the drops were comparatively small (not over 600 pound hammers), and the anvils were square in section. Instead of having a flange on the bottom, the anvils were tapered for about a foot below the regular length. Large logs were obtained and in the centers of one end cavities were cut, at considerable trouble, to fit the tapered end of the anvil. Around the tops of these logs were fastened heavy iron bands to prevent them from splitting. These logs were about eight feet long and were placed in a row on a bed of concrete for a sub-foundation. A box of planking was constructed around the whole of the row of logs and filled up to within a foot or two of the top of the logs. This made a fine foundation as to effect of blow and it held the anvils in good shape, but after about ten years some of the logs began to decay and then trouble began. The mass of concrete was so solid that it was impossible to break it away, and the logs had to be literally picked out in pieces. When all was removed another log was inserted in the hole and cement poured around it, thus giving it another lease of life and it was the hope of the management that it would last until their successors could come into their inheritance of trouble.

There are times when it is desirable to install small drop presses in the upper floors of buildings and in large cities there are many so placed and used for stamping up light work, such as medals, light jewelry, etc. In Providence and the Attleboros there are buildings in which are located a number of small concerns using drop presses and most of these buildings, when erected, are arranged so that timbers standing on end are passed up through the floors for the drop presses to stand on. But the buildings in the large cities are not built so that this can be done, so arrangements must be made to set the drop presses on the floor and then two questions arise, one as to how to arrange to obviate noise and jar, which would disturb other tenants, and the other how to secure best results for effect of the blows of the hammer. Where the anvils are made from fifteen to twenty times the weight of the hammer it is a simple proposition to effect both of these results, but with light anvils desirable results cannot be well attained. If the anvil is specially designed and made heavy enough, all that is required to set it up is to build a platform of timbers slightly larger than the base of the anvil and fasten the anvil to this and place under the platform disks of rubber or thick rubber packing. The anvil, being heavy, will absorb the effect of the blows and give as good a result as if placed on a solid foundation and the rubber disks or packing will absorb the noise and jar. When the anvils are light, in proportion to the weight of the hammer, good results cannot be obtained by any method adopted to set these drop presses up, without solid foundations. Often timbers are piled up on the floor, bolted together and the

*Managing partner of the Miner & Peck Manufacturing Company, New Haven, Conn.

anvils placed on these, there being springs of some sort placed under the mass of timbers. Good results cannot be obtained, however, under these conditions and it answers only as a makeshift. As I said before, the only solution of the problem, of placing these machines on upper floors or lofts of city buildings, is to have the anvils specially designed and made quite heavy.

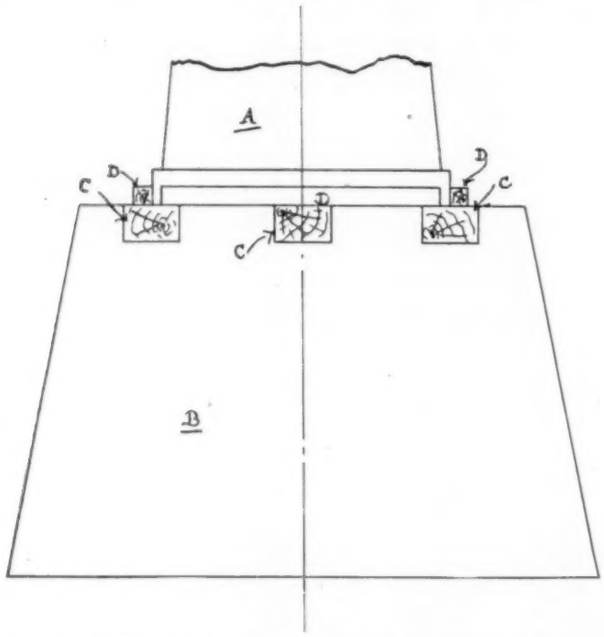


FIG. 2. DROP PRESS ANVIL FOUNDATION TIMBERS SET IN CONCRETE BASE.

To sum up the whole matter of foundations of drop presses I would say that where the anvils are properly designed and are as heavy as fifteen times that of the hammer; for the larger sizes, the best and cheapest one is made by digging down to hard pan; build up a box of timbers about a foot larger than the base of anvil and fill this box with concrete, placing across the top and imbedded in the concrete timbers from front to back, having them come flush with top of concrete. Then place the anvil directly on the timbers and to fasten it in place spike sticks of wood along the sides. The anvils being heavy there is no need for bolting them down to the foundation. (See Fig. 2.) Where the anvils are light compared with the weight of the hammer the best foundation consists of timbers placed on end and bolted together, these timbers being placed on a foundation of concrete as shown in Fig. 1. Where a row of drops are to be set up and a good bottom of hard pan cannot be readily secured the best plan is to dig a trench long enough to take in the entire row and quite wide. Then make a sub-foundation filling this whole trench, in area, with a mass of concrete and making it two or three feet thick. In this mass place sticks of chestnut timbers to hold the mass together and on this sub-foundation build up individual foundations for the various drop presses, varying them to conform to the proportion of anvil to hammer and the relative sizes. For small light anvils a large stick of timber placed on end makes a good foundation. Wood on end seems to have an absorbing effect of the blow and seems to prevent the anvils from jumping as light ones are apt to when placed on solid stone or concrete foundations.

THE INFLUENCE OF STYLE IN THE ART METAL WORK OF MODERN TIMES

By A. F. Saunders.*

It is the object of the several following articles to give the metal craftsman an idea of the influence the various styles or periods of ornament have upon the metal work of modern times, and he will find that a careful study of this interesting subject will prove of infinite value and assistance in his work. It would be absurd to assume that a subject of such vast magnitude as the gradual development of the various period styles could be adequately treated in the limited space of these few articles, but it is more with the idea in mind of stimulating the interest of the student craftsman in his work that I have attempted to give him some knowledge of the general characteristics of the various schools of ornament and their influence upon his metal work.

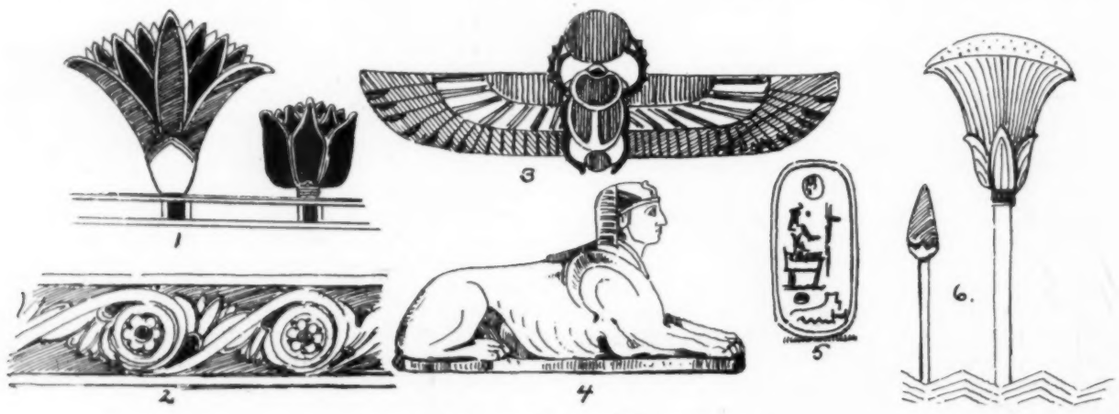


FIG. 1. EXAMPLES OF EGYPTIAN STYLE.
Fig. 1. Lotus border. Fig. 2. Mural fresco. Fig. 3. Winged Scarabeus. Fig. 4. Sphinx. Fig. 5. Cartouche of Rameses. Fig. 6. Papyrus ornament.

The study of the styles of ornament is in itself one of the most interesting of subjects, and it should be our earnest endeavor to thoroughly familiarize ourselves with the development and principal characteristics of the various decorative styles. We sometimes talk of style as though it were the simplest thing in the world to explain, but the closer one studies the subject the more one realizes that, like life itself, it is ever changing and most evolu-

*Designer, Benedick Manufacturing Company, Syracuse, N. Y.

tionary. Style is really more the product of one epoch of time rather than of a single people, and very often the style or change of a style is so closely linked with the history of a nation or of a certain period that it is strongly influenced by it. It is therefore necessary at the very beginning that we should have a comprehensive knowledge of the chronological arrangement of the styles which I give below, based on tables arranged by one of the best authorities on the subject, the late Owen Jones. As these articles have only to do with definite period styles of ornament we must pass over that of the prehistoric or primitive ages, which although forming the foundation of genuine style, is so widely separated by time and space that it really forms a distinct subject by itself. In decorative ornament two principles strive for mastery—the classic and the romantic. The fundamental principle of the classic is proportion, balance and beauty of form. Of the romantic complexity, mystery and life. Once this distinction is thoroughly

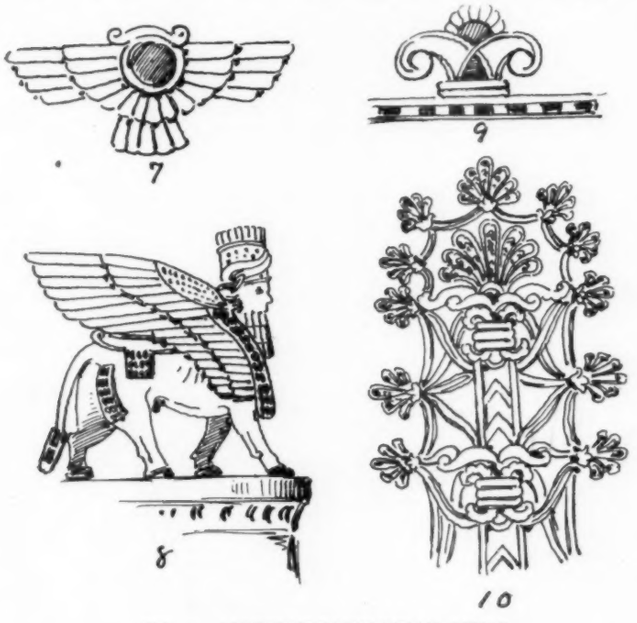


FIG. 2. ASSYRIAN-BABYLONIAN STYLE.
Fig. 7. Assyrian Winged Globe. Fig. 8. Sacred winged bull. Fig. 9. Wall decoration, Babylon. Fig. 10. Sacred tree.

understood it is comparatively easy to understand the lesser distinctions between the subdivision. To more properly comprehend the meaning of this we will now look at the chronological arrangement of the various styles of ornament.

CLASSIC STYLES (ANTIQUITY).

Egyptian Ornament.
Babylonian-Assyrian.
Persian.
Indian.
Grecian, divided into four epochs
I. Mythical period.
II. Doric.
III. Ionic.
IV. Hellenic.
Roman.

ROMANIC STYLES (MIDDLE AGES).

Byzantine (Roman Orientalized).
Romanesque.
Keltic.
Russian and Scandinavian.

The Islam series:
Arabian.
Moorish.
Saracenic.
Ottoman.

Gothic:
French, English, German, Italian.
Chinese Ornament } (Contemporaneous).
Japanese Ornament }

ROMANTIC STYLES (MODERN TIMES).

The Renaissance:
Italian, French, German, Spanish, English.

MODERN FRENCH DEVELOPMENT OF STYLES.

Louis XIV (Barocco).
Regence (Barocco).
Louis XV (Rococco).
Louis XVI.
Empire Semi-Classical.
L'Art, Nouveau (new art) Movement.

Beginning with the earliest, the decorative art of the Egyptians, we will take up briefly the principal characteristics and fundamental features of the above styles. The

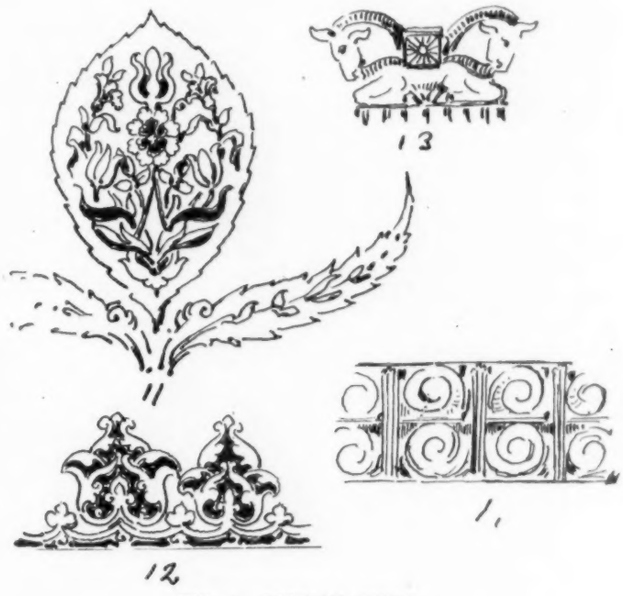


FIG. 3. PERSIAN STYLE.
Fig. 11. Persian ornament. Fig. 12. Fresco, Persepolis. Fig. 13. Capital, winged steer. Fig. 14. Bas relief.

antiquity of Egyptian art and its influence upon the art of succeeding generations render it especially interesting. Symbolism, which was the very principle of the religion of the Egyptians, predominated all through their decorative art. Most frequent motifs are the winged beetle (Scarabeus) emblem of immortality, lotus flower and bud, palm, papyrus or paper plant. Mythological gods provided with symbolic attributes usually having a human body surmounted by an animal's head like "Rha," with a hawk's head; "Sekhet," the head of a lioness; "Osiris," bearing a disk between two horns on her forehead, and "Isis," goddess of the Nile. In the "Sphinx," on the contrary, is found the human head placed upon the body of an animal. Egyptian art is, so to speak, a written language pictorially represented, apart from pure geometric ornament it consists in a rigidly systematic arrangement of native plant life, men and animals. The illustration in Plate 1 give a clear idea of several of the characteristic features of this style. Next in order is the Assyrian-Babylonian which, while showing in many ways Egyptian influence, nevertheless, is a distinct and individual style, systematic in arrangement and very strong in symbolism. Chief among its decorative motifs are the

palm, lotus, feather and the so-called sacred tree (see Fig. 2), and numerous combinations of animal forms, most potent of which is the crowned, winged bull symbolical of strength and wisdom, always used in pairs and usually represented divided by the above-mentioned sacred tree.

Persian ornament can show but very little characteristic peculiarities, Egyptian, Assyrian and Hellenic influences being plainly discernable all through its composition. Its principal motifs are founded on the plant and animal life native to the country, arranged in symbolical and complex combinations. Those especially prominent are the lion, winged horse, winged steer, lotus, palm, and in its later development scroll forms of distinct character. Fig. 3 shows several of the best-known examples of Persian motifs. In the next article of this series we will take up the remaining styles of the classic period, endeavoring to make clear their general characteristics. It is essential that the student craftsman should have at least a superficial knowledge of these, to better enable him to more clearly comprehend the articles to follow on the influence of the styles on the art metal work of today.

PATENT CONTROVERSY OVER BEARING METALS

THE CONTINUATION OF AN INTERESTING DISCUSSION WHICH WAS BEGUN IN THE JULY, 1909, ISSUE OF THE METAL INDUSTRY. THIRTEENTH PAPER.

BY ANDREW ALLAN, JR.*

"I WOULD SUGGEST THAT MR. CLAMER SEND TO 'THE METAL INDUSTRY' ONE HUNDRED POUNDS OF EACH OF THE ABOVE ALLOYS (Cu.50-Pb.50 Cu.65-Pb.30-Sn.5 Cu.67-Pb. 24-Sn.9). 'THE METAL INDUSTRY' TO HAVE SAME ANALYZED, AND IF FOUND TO BE OF THE PROPORTIONS CALLED FOR AND STRICTLY LEAD-COPPER AND LEAD-COPPER TIN, TO HAVE SAID ALLOYS RECAST INTO MERCHANTABLE CASTINGS UNDER THEIR SUPERVISION. IF THESE CASTINGS SHOW NO LEAD SWEAT OR SEGREGATION, I WILL WILLINGLY ASSUME ALL COSTS INCURRED BY THIS TEST AND CONCEDE MR. CLAMER TO BE ONE OF THE ABLEST METALLURGISTS OF THE TWENTIETH CENTURY."

From the July, 1911, issue of THE METAL INDUSTRY.

MR. CLAMER ACCEPTS:

"I TAKE PLEASURE IN SENDING TO THE OFFICE OF 'THE METAL INDUSTRY,' IN ACCORDANCE WITH MR. ALLAN'S SUGGESTIONS IN HIS ARTICLE IN THE JULY ISSUE OF 'THE METAL INDUSTRY,' SEVERAL INGOTS OF THE FOLLOWING COMPOSITIONS:"

From the October, 1911, issue of THE METAL INDUSTRY.

We have now arrived at the most opportune period in the controversy to review the claims put forth and draw conclusions. The concession I was prepared to make and the conditions governing same were perfectly clear and concise and gave Mr. Clamer an opportunity to prove some of his claims. Mr. Clamer must have fully understood my request, and its intent, when he forwarded the ingots of alloys specified. But now when the test is about ready to proceed, Mr. Clamer's most startling letter of October 24, as published in THE METAL INDUSTRY, for November, 1911, comes to light with its astounding contradictory statements and protests as to conditions under which he forwarded the ingots to THE METAL INDUSTRY.

The analyses of ingots have been made and found to be as represented, but the castings and final analyses to determine segregation, I regret have not been made, due to no fault of mine. I very much regret that owing to pressure of business, Mr. Clamer could not spare the time to come to New York for one day during the past month to witness the casting. I could hardy accept Mr. Clamer's suggestion that a proxy witness the casting in his stead. Upon the results of this test I have offered to make concessions and have also agreed to assume the cost of final analyses, and under such conditions I expected Mr. Clamer to so arrange that he could personally witness the casting, so that every condition under which castings were molded and cast would have his personal approval, so that no possible exception could be taken to the final results.

In Mr. Clamer's paper published in the October issue of THE METAL INDUSTRY, he seems to lean as a last hope of success, as to whether we produced lead-copper-tin alloys prior to his patent, and would have you believe that this is the most important factor in the controversy. I want to state right in the beginning of this paper, that when we first sold lead-copper-tin alloys has no bearing on the controversy. The all-important questions to be decided are: Is this art based on how to control the lead? Has a critical relation between tin and copper required to make possible high percentage of lead been established? Are claims made in Letters Patent 12,880 operative? Can lead-copper and tin be alloyed by ordinary foundry practice in any proportion with lead at more than 20 per cent., tin at less than 7 per cent., and the balance copper, by limiting the tin to less than substantially 9 per cent. of the copper in the mix? Did Andrew Allan, Sr., invent the art by which this could be accomplished?

Mr. Clamer states that I have not been charitable. A controversy is hardly a place to extend charity, but I have used every effort to be just and avoid as much as possible humiliating my contestant. I regret that Mr. Clamer's indisputable authoritative attitude and the free use of sarcasm, by which he has endeavored to cast contempt and ridicule upon my statement, forces me to bring out the facts without reserve.

First, in my February, 1910, paper I showed the following alloys:

Copper	Tin	Lead
58½	6½	35
62½	7½	30
67	9	24
70	10	20

In May, 1910, Mr. Clamer comes out with the astounding statement:

"I am perfectly familiar with the fact that copper-lead and tin can be mixed in proportions as set forth by Mr. Allan, having covered the ground a number of years ago when studying copper-tin and lead compositions in every conceivable combination, so that the matter which he now presents is not new to me at all."

In July, 1910, I suggested that Mr. Clamer produce these alloys which were not new to him at all, to which he replied in his March, 1911, paper by making the astounding admission that he could not produce the alloys, Cu. 58½, Sn. 6½, Pb. 35 and Cu. 62½, Sn. 7½, Pb. 30, that by including these two alloys in his former statement he was quoting from memory. Now I expect to make allowances for slight technical errors, but when Mr. Clamer makes a statement as to what he can accomplish in this

*Andrew Allan & Son, New York.

art, I expect that when called upon to verify his statements, he will not have to admit his inability to do so.

Second, in August, 1909, in referring to lead-copper alloys, similar to Allan Red Metal, Mr. Clamer states:

"I strongly doubt, however, if any beneficial effects are to be derived from its use (sulphur); at least I can POSITIVELY say that lead can be held in a mechanical mixture just as well without it."

"No claims whatever have been at any time made by us to a copper and lead alloy without a hardening constituent, as we have long been PERFECTLY FAMILIAR with the fact that lead and copper when melted together and poured into castings can be held in fairly uniform mixture in a casting, even of considerable size, such castings having been frequently made by ourselves and others."

In November, 1909, Mr. Clamer further states:

"We do, however, manufacture such alloys, i. e., containing 40 to 60 per cent. copper and 40 to 60 per cent. lead."

Now, in the very face of the above statements, Mr. Clamer has been forced to come out in his most startling letter of October 24, 1911, and admits his shortcomings on lead-copper alloys. The ingots of 50 per cent. copper and 50 per cent. lead submitted by Mr. Clamer are horrible examples of lead-copper alloys and would be rejected on sight.

Third, in Mr. Clamer's letter of October 24, he makes the further astounding statement that:

"A commercial casting is one which does not show lead sweat. To bear out my contention that such castings are commercially good, it is but necessary to observe the fact as to whether or not the castings exhibit lead sweat after casting."

Mr. Clamer would have you believe that lead-copper-tin alloys in which the lead has segregated in pools is a good commercial casting. He would have you believe that a casting in which the lead has segregated to the bottom is a good commercial casting, due to the fact that it does not exhibit lead sweat.

Let us read from the Ajax Metal Company's catalog, page 16, and note the inconsistency of Mr. Clamer's statements:

"Ajax as Compared with Similar Compositions.

"What we CLAIM for the AJAX PROCESS of making this alloy is that the LEAD is DISTRIBUTED EVENLY throughout the mass as represented by Fig. IV., which shows the effects of our process. The difficulty encountered in making a perfect mix of lead with copper and tin, viz.: High specific gravity, low melting point and lack of affinity of the lead for the copper and tin, in ordinary alloys of these metals, causes it to distribute itself unevenly throughout the mass as is shown in Fig. V. a competitive material of the same composition as Ajax. The light spots in the above photo-micrograph shows the lead in the Ajax metal evenly distributed in the alloy and in our competitor's alloy in pools. It is not difficult to understand the relative value of these two metals. The one with segregation lacks not only strength, but also the antifrictional qualities as is fully explained in our Mr. Clamer's article on the 'Microstructure of Bearing Metals,' Vol. 146, pages 148 and 149, The Journal of the Franklin Institute."

Why does Mr. Clamer now take the stand that segregation is of no consequence and that only avoiding lead sweat is an important factor?

Fourth, in Mr. Clamer's paper of August, 1909, we read:

"The difficulty which we overcame was not in alloying lead and copper alone, but in alloying lead and copper in the presence of tin. Tin when present in too great an amount in proportion to the copper will segregate the lead if present in amounts somewhat exceeding 20 per cent."

How has Mr. Clamer overcome the difficulty of alloying lead and copper in the presence of tin, when he admits that the ingots of 65-30-5 and 67-24-9 submitted, have segregated? What would be the percentage of segregation in an alloy of 64.25 per cent. copper, 30 per cent. lead 5.75 per cent. tin, made partly from scrap metals containing impurities, when an alloy of 65-30-5, made from the best brands of virgin metals Mr. Clamer concedes segregates about 3 per cent.?

Fifth, in Mr. Clamer's letter of October 26, we read:

"My claims have always been that alloys made within the limits of my diagram will not show lead sweat and that no sulphur is necessary to prevent them from showing lead sweat."

How about Mr. Clamer's process of making these alloys whereby the lead is distributed evenly throughout the mass?

Sixth, from Mr. Clamer's paper read before the American Foundrymen's Association Convention at Cincinnati, June, 1909, we read:

"This with a small fraction of sulphur, which is of no materiality, is the combination made use of by the defendant, who thus admittingly infringe, if the patent is valid."

In Mr. Clamer's letter of November 1, 1911, we read:

"I suggest also that it would be interesting to have analysis made of the same alloys with additions of sulphur, as compared with alloys made by the Allan process, provided the Allan process is anything different from the plain addition of sulphur."

You will note Mr. Clamer is ready to concede that the Allan Process controls the lead in lead-copper-tin alloys where the tin is less than 9 per cent. to 91 per cent. of copper in the mix, as well as when the tin is more. He also admits that sulphur is of some materiality in lead-copper-tin alloys, and that the defendant alloy referred to above must be a superior alloy, due to the presence of sulphur.

Seventh, from Mr. Clamer's October, 1911, paper we read:

"Mr. Allan has heretofore been unwilling to admit that sulphur and the 'Allan' process are one and the same thing."

Whenever I have made a statement in this controversy and called upon to verify the same, I have never had to admit my inability to substantiate my claims. The mere fact that Mr. Clamer states that the Allan process and sulphur is one and the same thing, is no evidence that he is capable of obtaining the same results.

In my February, 1910, paper I made the following statement:

"With reference to sulphur, same does enter into our process, a fact which many manufacturers appreciate and endeavor to profit by."

In July, 1911, I stated:

"Sulphur is a factor in the production of lead-copper and lead-copper-tin alloys—it forms a part of the Allan process—its use in the manufacture of bearing metals was introduced by Andrew Allan, Sr. Any one using sulphur to control lead in bearing metals is using a part of the Allan process. I claim these alloys cannot be commercially produced without it, also they can only be made within certain limits commercially by ordinary foundry practice assisted by the use of sulphur, falling far below the series shown in my diagram."

Eighth, we will now take up for final consideration the COMBINATION OVER and UNDER DIAGRAM presented by Mr. Clamer. This diagram is, in my opinion, sufficient evidence of the absurdity of claims made in Letters Patent 12,880. You will note in this COMBINATION OVER and UNDER DIAGRAM, the lower end of the curve somehow has taken an upward bound to include alloys, which in Letters Patent 12,880, Mr. Clamer tells us are impossible, and the shortcomings of the upper end of the curve are deplorable and prove the inconsistency of patent claims. If a critical relation between tin and copper required to make possible high percentage of

lead could be established at 9 to 91, the only true curve would be the one shown in my diagram.

Ninth, let us read from Mr. Clamer's paper of March, 1911:

"Mr. Allan, Jr., in the July number of THE METAL INDUSTRY produced some photographs and analyses of copper-tin-lead bearings which contained TIN IN EXCESS OF THE AMOUNT REPRESENTED BY THE PROPORTIONS OF 9 TIN TO 91 COPPER, AS CALLED FOR BY THE LITERAL INTERPRETATION OF THE PATENT CLAIMS COVERING PLASTIC BRONZE."

"The field is open to all to make alloys containing percentages of tin in excess of approximately 9 to 91 per cent. copper by this means."

Mr. Clamer admits his shortcomings on the literal interpretation of his patent claims and yet would endeavor to convince you that if you can produce the alloys as shown in my diagram, you must not, as he claims patent rights on that which he cannot produce.

Tenth, in my July, 1911, paper I made the following statement:

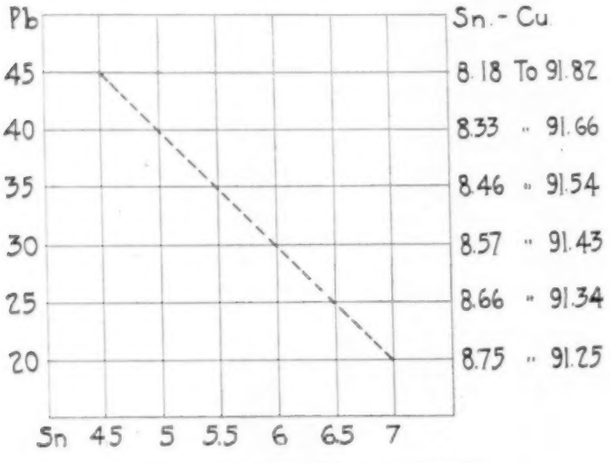


FIG. 1. A TRUE 9 TO 91 DIAGRAM.

"It is a question of degrees of difference, for the amount of tin determines the hardness of the copper rich matrix."

I would call attention to Mr. Clamer's disordered views of this statement.

"In other words, he (Mr. Allan) contends that sugar and water are the same as coffee. Sugar and water is a solution of one constituent in another, whereas the addition of a small percentage of the third constituent, i. e., coffee, according to his (Mr. Allan's) contention does not alter the sugar and water, except in degree."

The basic alloy is lead-copper, the same as coffee and water. The alloy is only changed in degrees according to the amount of tin added, by hardening the copper rich matrix, the same as coffee-water is only changed in degrees according to the amount of sugar added, by sweetening the water matrix.

Eleventh, Mr. Clamer states in his October, 1911, paper:

"This is the process invented and on which patent rights are claimed, i. e., that in order to incorporate a certain high percentage of lead, it is necessary to restrict the percentage of tin, when ordinary foundry practice is followed, and I cannot understand why Mr. Allan, as he has evidently been doing a lot of experimenting along this line, will not admit this fact, as he certainly must be conversant with it, if he just once attempted to produce the alloy."

Mr. Clamer has failed to prove that which he would expect me to admit. My experimenting along these lines was done years ago and not of recent date, as Mr. Clamer is inclined to believe. The readers of THE METAL INDUSTRY no doubt believe that this controversy was prompted by the reading of a paper on "The Patent Situation in the United States Respecting Alloys," at the Cincinnati Convention of the Brass Foundrymen's Association, May, 1909. While this is quite true, my interests forced me to reply to that paper. It was incumbent upon me to state my variance with Mr. Clamer's claims in the interests of myself and all bearing metal manufacturers. My reply was necessitated by receipt of a circular letter in April, 1909, notifying us that if we manufactured lead-copper-tin bearings or bearing metal containing more than 20 per cent. lead and less than 7 per cent. tin and the balance copper, by limiting the tin to less than substantially 9 per cent. of the copper in the mix, we would be infringing patent rights.

In closing I wish to state that Mr. Clamer has failed to put forth any substantial evidence in support of his claimed metallurgical discovery of a critical relation between tin and copper required to make possible high per-

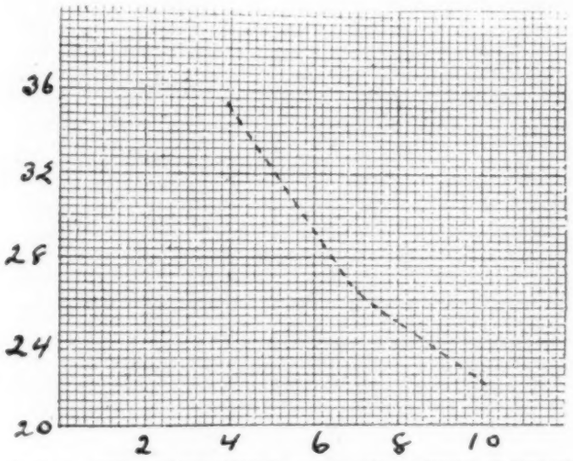


FIG. 2. THE COMBINATION OVER AND UNDER DIAGRAM.

centage of lead by limiting the tin to less than substantially 9 per cent. of the copper in the mix, a discovery on which his patent claims are based.

REPORT OF BEARING METAL ANALYSIS.

The results of the first analysis of the ingots received from Mr. Clamer by THE METAL INDUSTRY are as follows:

	Ingot x.	Ingot xxx.
Copper	67.36%	65.87%
Tin	9.21%	5.02%
Lead	23.21%	28.96%
Sulphur	0.05%	0.04%
Iron	0.07%	0.07%
Arsenic	0.02%	0.01%
Nickel	None	None

It will be seen from the above that the composition as agreed upon by Messrs. Allan and Clamer as published in THE METAL INDUSTRY for November, 1911, have been fulfilled.

The casting test which consists of making a cylinder eight inches long by five inches in diameter and examining the same for lead sweat and final analysis for segregation has not yet been carried out. This will be done, however, at an early date and results reported.—[ED.]

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CONTENTS

	Page.
The Manufacture of Rifle Cartridges	1
History of Manganese Bronze	5
New Malleable Copper Alloy	6
The Origin, Manufacture and Beauty of Tin	7
The Future, Present and Past of Electro-Plating	9
Electro-Engravers' Copper Sheets	10
The Woes of a Patternkeeper	12
Turret Lathe Practice in Manufacture of Brass Goods (Continued)	13
Artistic Bronzes	15
Hints on Brass Founding (Continued)	16
The Manufacture of Wrought Brass (Continued)	20
The Selection and Use of Scrap	22
Progress in the Rust Proofing of Iron and Steel	23
Foundations for Drop Presses	25
Influence of Style in the Art of Metal Work of Modern Times	26
Patent Controversy Over Bearing Metals—Thirteenth Paper	28
Editorial:	
1912	31
Review of 1911 and Outlook for 1912	32
New Book:	
"Electro Analysis"—Edgar F. Smith	34
Criticism and Comment:	
Pertinent Replies to Plater's Plaint	34
Automatic Drying Machine	35
Color Deposition	35
Brass Drill Breakage	35
Shop Problems	36
Patents	38
Industrial:	
Automatic Polishing and Grinding Machine	40
New Sand Blast Mill	40
Self-Contained Sand Blast Mill	41
Combination Sand Blast Outfit	41
A New Molding Machine	42
Spotless Electric Cleaning Compound	42
New Single Crank Press	43
Multiple Drill for Drilling Metal Plates	43
A Condenser Tube for Marine Work	44
New Type of Electro-Plating Dynamo	45
Keystone Emery Process	45
Personals	46
Associations and Societies	46
Correspondence	49
Trade News	54
Metal Market Review	59
Metal Chart	61
Metal Production in the United States	62
Metal Prices	63

1912

With the issue of this number THE METAL INDUSTRY enters on its tenth year, and throughout this tenth year—1912—we will endeavor to maintain the high standard of the past, making this journal the acknowledged authority on metals and alloys.

We have already made arrangements with the best writers of the world to publish a series of articles on timely subjects of vital interest to the metal industry and our departments will continue to record the progress that is constantly taking place in the respective arts of these departments.

Likewise our advertising pages will continue to be a guide for all firms buying metals, machinery and supplies, for only such advertisements are accepted by THE METAL INDUSTRY that are suitable for the publication. All advertisements are classified and arranged so they may be quickly found by the buyer who is searching for the makers of his desired equipment. Our advertising index is also a handy key to all advertisements in each number of the paper, and this index is not broken into by other advertising and is always placed in the same position of the paper.

THE METAL INDUSTRY can be read with advantage by the owner, the buyer, the manager, the superintendent and the foreman, for the reading and advertising pages each month contain information which is of value to the head of every department in a metal factory from the owner down.

In this age of superabundance of printed matter a good many firms and individuals complain that they do not get time to read the flood of trade journals, and surely a man who attempted to read all that are published would have nothing else to do. He should therefore restrict his time to the trade journals in his line and he may have to reduce his list to the best journal in his art or industry. Having selected his trade journal he should then read it most carefully and constantly keep by him for reference a current issue, and then pass the older issues over to whomever he thinks would be interested. In this way the subscriber is benefited, informed and instructed and the editorial and business ends of the trade publication have their efforts rewarded for their constant toil to issue a trade journal that is worth reading.

RETROSPECTIVE REVIEW OF 1911—OUTLOOK FOR 1912.

A Brief Report of Business Conditions Existing in the Metal Industry for the Past Year. Prospects for 1912, and Passing Notice of Some of the More Notable Business Events and New Labor-Saving Devices.

GENERAL CONDITIONS.

As predicted in January of the year just past, 1911 has witnessed no extraordinary business operations. No great expansions of industrial enterprises or startling developments of old or new installations in the metal industry, have taken place. Conservatism and a "hand to mouth" policy regarding consumptive materials have characterized the conduct of the manufacturing world. The early part of the year was passed by the business world in an attitude of "waiting to see what would happen." With the decision of the Supreme Court of the United States regarding the status of the "trusts" and the reading into the Sherman law the word "reasonable" the wheels of industry began to turn a little bit faster. New projects began to receive more attention and plans for enlargement and increase of production were given renewed consideration. In fact the whole country today may be said to resemble a group of Marathon runners crowded on the starting line waiting for the starter's pistol. Everyone is waiting for the return of that most necessary element to business development and success, public confidence. This confidence in the future is based on a number of things, of which the tariff question is perhaps the most important. The attitude of the Government toward the trusts, of course, receives a due amount of consideration. The coming presidential election is given by many men prominent in the business world as the most potent reason for the conservative attitude now evident.

While it has been freely stated on all sides with apparent good reason that business is being separated from politics, this process is a very slow one. There is no doubt that at the present time business in general is anxiously awaiting the outcome of the election and the future is not being discounted to any appreciable extent. There has been recently some quite heavy buying of copper and fuel by some of the largest consumers and, in the case of the metal, this may be due to depleted stocks and an indication that the price is expected to still further advance, with more curtailment of output by the producers. In the case of fuel the reason is more apparent, as it is known that the agreement between the mines and coal operators expires in April and there is every indication of a strike. Regarding copper, there are numerous reasons for the belief that the price will soon reach fifteen cents and remain there. Chief among these reasons is the belief that European consumption will continue at its present rate and, in fact, will increase. But even should this be so, if production exceeds the demand to the extent that it did in 1910, there must surely be a lowering in price. A full resumé of metal prices for the year will be found in our annual metal market review, published in this issue.

A general review of conditions shows that the present price is based on a healthy foundation. The recent stiffening of the price, together with the new prices for brass, issued January 12 by the brass manufacturers, is ample evidence of the healthy condition of the metal industries, for orders did not fall off with the announcement. On the contrary, the close of the year found the largest manufacturers unable to close their mills for the customary inventory shutdown. A perusal of the reports from the cities that are manufacturing centers shows the same condition: Order books better filled at this time than at the close of 1910. In the brass and copper manufacturing towns, such as Waterbury, Torrington and Bridgeport, Conn., Rome, Buffalo, Hastings and New York, N. Y.; Detroit, Mich., and Kenosha, Wis., is to be found the same state of affairs, mills running practically full handed on nearly full time and help scarce. In one large industry, that of automobiles, which consumes a large amount of metals other than steel, we find factories hampered for lack of help, slowness in delivery of supplies and consequent inability to fill orders in the time specified by customers. The foundry towns, where are concerns engaged in the production of automobile hardware and plumbers' supplies and accessories, report in the same vein. New Britain, Bristol, Hartford, Stamford and New Haven, Conn.; New York, Brooklyn and Buffalo, N. Y.; Trenton, N. J.; Philadelphia, Reading and Pittsburgh, Pa.; Cleveland, Cincinnati, Dayton and Toledo, Ohio; Chicago, Ill.; Milwaukee, Wis.; Detroit and Flint, Mich., all give a most satisfactory account of the present state of business and predict bright prospects for 1912.

The manufacturing jewelry centers show a gratifying confidence in the return of business prosperity and we hear this from such cities as Providence, the Attleboros, Newark and Philadelphia. In the words of Edwin Holbrook, president of the Gorham Manufacturing Company, conditions are as nearly normal as they can be after the protracted two years' depression. He says:

"We believe that at the close of the year merchants will find their stocks are depleted, and there should be an early demand for replenishing. While we are not anticipating an entirely normal year for next year, we believe the conditions are such that there will be a considerable activity in the early part of the year, followed, probably, by a dull time, as the approach of the political conventions and election come near."

FAILURE OF RECIPROCITY WITH CANADA.

In January, 1911, President Taft and Secretary Knox proposed a reciprocity trade agreement with Canada to take the place of the Treaty of 1864, abrogated by the United States in 1866. The ground work of the

proposed agreement was the mutuality of the economic interests of both countries. It provided for an exchange, both of natural products and of manufactured commodities, on a basis that was beneficial alike to producers and consumers in both countries. The adoption of this treaty was finally rejected by Canada by a popular majority of 35,000 in a total vote of 1,200,000. The reason for this rejection is summed up in an opinion by Hon. George E. Foster, Canadian Minister of Trade and Commerce. He says:

"Canada considered that the kindly and friendly relations now happily existing, and which were never more kindly and friendly, would be better conserved by each country preserving its complete fiscal independence, free from the entanglements and possible differences inherent in such a compact between neighboring countries of vastly unequal populations and trade and financial dominancy."

The failure of this treaty to be put in force between the two countries is to be regretted and must be regarded as one of the business disappointments of the year 1911. That Canada had a great deal to gain and little to lose cannot be denied, while the economic conditions that were the basis of the pact will continue to be favorable to the United States. As the agreement was approved by the Congress of the United States, its terms are still part of the law of this country, as a condition precedent to the designated tariff concessions becoming effective in both countries. Whether Congress will repeal the reciprocity legislation or not is a problem not at all difficult of solution.

IMPORTANT BUSINESS CHANGES IN 1911.

The most important business changes for 1911 were probably the reorganizing of two of the so-called trusts. The American Hardware Company of New Britain, Conn., as told in THE METAL INDUSTRY December, 1911, adopted the plan of its president, Charles M. Jarvis, and terminated the corporate existence of its constituent companies. These changes were stated to be made to evade conditions which are now understood to be in violation of the Sherman law. Following the lead of the American Hardware Corporation is the American Brass Company, Waterbury, Conn., a corporation of Connecticut formed as a holding company, to hold the stock of seven or eight different concerns located in Torrington, Waterbury and Ansonia, Conn., and Kenosha, Wis. At the next meeting of the American Brass Company the new plan now in effect will be ratified and the constituent companies will become branches o fthe American Brass Company. A full report of this change will be found in the Waterbury correspondence in this issue of THE METAL INDUSTRY. Among the material industrial changes of the year is the move of the Baird Machine Company, manufacturers of metal working machinery of Oakville, Conn., to Bridgeport, Conn. This move is a decided acquisition for the hustling town called the Industrial Capital of Connecticut.

NEW INSTALLATIONS, DEVICES AND PROCESSES OF 1911.

THE METAL INDUSTRY during the past year has endeavored to faithfully chronicle and record the installation and invention of new devices, processes, etc., pertaining to the metal industry. Chief in importance was the completion and operation of the rolling and wire mill of Shimer-McGlynn & Company, Inc., of Philadelphia. This concern is now one of the factors in the rolling and drawing of metals. A specialty is made of Monel metal in rods, sheet and wire as well as the production of special metals and alloys. Early in the year the Rockwell Furnace Company, of New York, brought out a melting furnace so arranged as to be capable of pouring its contents into the mold without moving the mold. This should prove a boon to concerns desiring to pour large quantities of metal at one time. This furnace was described in detail in THE METAL INDUSTRY for January, 1911. Later in the year we find J. B. Wise, of Watertown, N. Y., awarded a patent on a similar device. In May of last year Dr. Carl Hering announced the perfection of an electrical furnace in which advantage has been taken of the heretofore obstacle to successful operation known as the "pinch effect." This furnace is to be manufactured by the Ajax Metal Company, of Philadelphia, who purchased the sole right. David L. Summey, of Waterbury, Conn., has just been granted two patents covering machinery for the extrusion of metal in the form of rods and tubes. The Hoyt Metal Company, St. Louis, Mo., have been granted a patent on a two-ply britannia metal. This is a plate of metal composed of a facing of britannia with a core of base metal much cheaper in composition than the facing. The General Bakelite Company, of New York, announced the putting on the market of "Bakelite," a new lacquer made without fusel oil or amyl acetate, and The Chemical Products Company, of Boston, came to the front with a fire-proof lacquer.

Among the notable processes noticed during the past year were "Voltite" in August, a method of plating one metal on another by friction. "Coslettizing," described in May, is a process for the protection of iron and steel from rusting by means of phosphoric acid. In November and December came descriptions of "Electrochroma," a process for the production of colors on metal surface by means of the electric current. This process, the invention of a San Dominican—Arquimedes Rojas—bids fair to revolutionize the finishing process for art glass goods, builders' and cabinet makers' hardware and cheap jewelry. Among the new metal discoveries in December we have the announcement of the recent discovery in Canada of a new metal which has been rightly named "Canadium." This metal is said by its discoverer, A. G. French, of Nelson, British Columbia, to be a beautiful white metal, little softer than gold or silver and melting at a slightly lower temperature. In addition to this natural metal there have been announced a number of new alloys, the merits of which are still in a state of uncertainty, but which will be closely watched and results announced as soon as data can be gathered.

IMPORTANT EVENTS FOR 1912.

Among the events scheduled for 1912 interesting to the workers in the metal industry are the various automobile shows to be held throughout the country. The

largest of these are now coming to a successful close at Madison Square Garden and the Grand Central Palace in New York, and have set a very high standard for others to follow. In June comes the annual convention of foundrymen, in which four associations take part together with an exhibition of foundry appliances and supplies. In September there will be held in New York City the twelfth congress of the International Society for Testing Materials, together with the International Chemical Congress, and these meetings are easily the society events of the year. These, together with the regular meetings of the numerous societies and associations promise to provide a lively year for all and bid fair to provide a wealth of material in the shape of papers and discussions to add to the library of the busy metallurgist, chemist, electro-chemist, plater and foundryman. In England there is scheduled besides the meetings of the Institute of Metals an exhibition, the like of which has never been seen before. This exhibiton is an international one of metals, and will be in the Royal Agricultural Hall, Islington, London, N., on May 6 to 18. This will be the first exhibition of its kind ever held in the world and is already attracting world-wide interest. A full description of the plans was given in our October number.

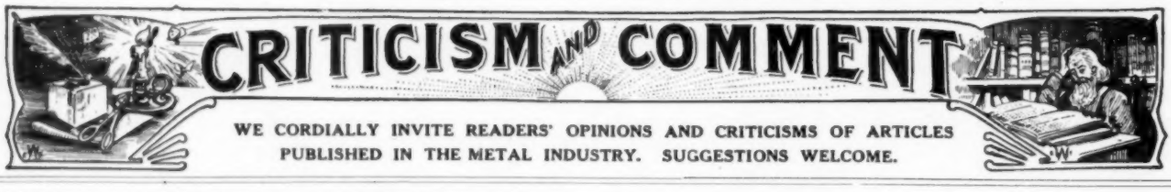
Taking it by and large, 1912 gives promise of being a busy and profitable year in all lines of endeavor. The political outlook at the present writing is problematical, and what the outcome will be no man can say. The country is in a safe, sane and healthy condition, and who can say but what 1912 will bring forth some wonderful and startling advances in the arts, professions or trades, as for us we can only say "Quien Sabe."

NEW BOOKS

"ELECTRO ANALYSIS," by Edgar F. Smith, Blanchard Professor of Chemistry, University of Pennsylvania, Philadelphia. Size, 5½ x 7½ inches. 332 pages with index. 45 illustrations. Bound in flexible seal leather cover.. Published by P. Blakiston's Son & Company, Philadelphia, 1911. For sale by THE METAL INDUSTRY. Price, $2.50.

This valuable work relating to the method of analysis known as Analysis by Electrolysis is just being published in its Fifth Edition. This edition contains as new material the essentials of all that has appeared upon electro analysis during the past four years. The recommendations given for rapid methods for metal determination or those in which the mercury cup and rotating anode are used, described in the Fourth Edition, has not been modified except to emphasize ordinary care and to add considerable data arising from practical experience. The daily studies in the laboratory of the author only tend to confirm the idea of the utility of the mercury cup, as well as that of the double cup, by means of which anions are estimated with the greatest accuracy and determinations and separations of the alkali metals are made with ease and comfort.

The book itself is composed of two parts with an introduction. The first part consists of eight chapters, covering 67 pages, and includes a description of the various sources of the electric current and instructions for reducing and measuring electric currents with descriptions of the apparata employed. There are also an historical sketch, formulae and methods for the rapid precipitation of metals in the electrolytic way. The second part of the work is devoted to a special part, comprising eight chapters and covers 260 pages and deals with the determination and separation of metals, special application of the rotating anode and the mercury cathode in analysis, oxidations by means of the electric current and combustion of organic compounds. Anyone engaged, or even interested, in electro-deposition of metals or their analysis should not fail to procure and study a copy of this book. The literature references are particularly voluminous and the subject matter is presented in a clear and simple style, easily understood by student and layman alike.


CRITICISM AND COMMENT
WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY. SUGGESTIONS WELCOME.

PROMPT REPLIES TO PLATER'S PLAINT

To the Editor of The Metal Industry:

The "Plaint of One Plater"* appeals to me. It would be absolutely amusing if it were not for the seriousness and truthfulness of its import to many a plater who thinks himself the peer of others, to find he is dropped sometimes so hard as to stagger him in such a way that he never again feels just the same. I know what this plater's plaint is; I have experienced it, with this exception: my understanding was unclouded as to surrounding things. You do not go into the water and expect to remain dry. You cannot work at plating and expect others to let you alone; even though it be a far more disagreeable class of occupation others with view with you for its attainment. The reason is apparent: Every man is anxious for himself and family to keep from want; and no man, this particular plater included, will stand aside and let others work while he seeks in vain for employment. Representatives of all other industries are as strenuously crowding for each other's places, and some far more so than electroplaters. Read Bulletin No. 93, issued by the Bureau of Census, Washington, D. C., which states: "Five million men are out of work in the United States." They are all after our jobs—when we have one, and vice versa when not. Can you blame them?

*The Plater's Plaint, The Metal Industry, December, 1911.

The Plater's Plaint proposes a very feeble remedy for this state of affairs. But there are remedies which are absolute, on which I will not dilate here as sufficient literature is already at hand. But the remedies of today that are applicable under our present system of industrial life are but two, one of them positive and the other negative, according to who looks at it, either employee or employer, reversing the polarity to each other. One remedy is to so improve yourself that you are constantly in demand. The other is, lower your wage rate so as to be constantly in demand. A survival of the fittest—take your choice. Savage to some, but true nevertheless. Increase your capabilities and you increase your worth. Stand still with them and you are outrun in the race. So your only hope to be left alone in a position of any sort is to be a peer in that line. This requires education and intellect combined, so study! This will compel your work or occupation to keep step with you, or you acquire a place where you will be sought after. This will also bring in its train a class of education that will help you to see clear as to the causes of this system of affairs and show you a positive cure for your own trade as well as all the human family; but without this other knowledge of industrialism or economic determination you will become a pessimist with its train of reasoning which means what people today imply when they use the name "anarchist." Your reasoning is jumbled "Mr. A. Plater." I sympathize with you; I understand your position, but do not agree that your remedy would be good if possible, or possible

if ever so good. I believe in advancing and so do you. Your scheme is an absolute retreat. See if you cannot think of some better plan; yours is not a remedy, it is an impossible scheme, and a far-reaching and menacing danger.

JOHN A. ANDERSON.

Gardner, Mass., December 20, 1911.

To the Editor of THE METAL INDUSTRY:

"One Plater's Plaint," by "A Plater" in THE METAL INDUSTRY for December, is interesting. I cannot agree with the author either as to conditions or remedy. Considering the fact that the National Electro-Platers' Association were compelled to withdraw their advertisement from the trade journals because they were unable to supply the demand for platers, it would seem that good platers would have no difficulty in securing positions. As for business concerns "looking for the lowest bidder," that surely can not be laid down as a rule. Business concerns certainly realize that a cheap man is very likely to be lacking in knowledge, ability or attention to business, and therefore an expensive man at any price. "A Plater" speaks of a "quickly-taught helper" seeking his teacher's or some other's position. There is your cheap man, "quickly taught," and therefore with small experience and smaller knowledge.

I believe the majority of the unemployed platers in the country today are lacking in some of the qualities that make for a desirable man in the plating shop. I have had some experience with them myself. Some were hired and fired the same week. "First-class platers," but could not make intelligent use of litmus paper; "first-class polishers," but their best work was a little color and many scratches; "industrious," but drunk within a week. I shall continue to follow as nearly as I can the Divine commandment, "Love thy neighbor as thyself," and teach my fellow-workers what I can, that they may be better able to battle with the storms of life, confident that each will find a place suited to his ability. And I have no fear that the other fellow will get my position as long as I keep up with the times and pay strict attention to business.

F. W. HOBBS, Foreman Plater.

Bangor, Me., December 18, 1911.

AUTOMATIC DRYING MACHINE

To the Editor of THE METAL INDUSTRY:

I have just noticed your articles on the drying of small metal articles, together with the letters in connection with same.* One can quite understand that articles having deep depressions, etc., are difficult to dry, and particularly difficult will it be to get the sawdust from the interior. A defect that a centrifugal dryer has is due to the fact that the operator has to stand over each basket to suddenly stop and start the machine. There is now being used in Birmingham a drying-out machine, which, I believe, is patented and improved by Messrs. Alldays & Onions, which not only thoroughly dries, but gives a perfect finish to the articles, and drops them automatically into any receptacle, free from sawdust. This takes place whether the articles be hollow, cupped or whatever shape they may be. I think a great advantage obtained from this new patent machine lies in the fact that the wet goods are just thrown into a hopper, and do not require to be handled again, no matter how large the quantity. And also the dipper can work the machine, which means the cost of handling is much reduced. Personally, I think this machine is a great advance upon any device of which I am at present aware, and I shall be surprised if it is not widely adopted.

A. W. GOODGE,

Birmingham, England.

*THE METAL INDUSTRY, March, June, July, August, 1911.

COLOR DEPOSITION

TO THE EDITOR OF THE METAL INDUSTRY:

Regarding the articles,* in recent issues of your valuable publication, concerning the coloring of metals by electro-deposition, I wish to state that to me such a method is not new, I having effected colorations by such a method as long ago as twelve years. About six years ago, while I was running a small plating shop, Mr. D. B. Moyer, who was then with the Zucker, Levitt & Loeb Company, saw me deposit from a copper sulphate bath a bright green coating, capable of being buffed, upon a zinc statuette which was not previously brassed or coppered. It might sound strange to some that a copper sulphate bath can be made that will not deposit its metal, even upon zinc or iron in the metallic form, yet it can be done. My only reason for making this assertion is that a great many people think that unless you come from the East you do not know anything about plating, and I do not doubt but that a great many in the East think the same unless you come from Paris.

LOUISVILLE.

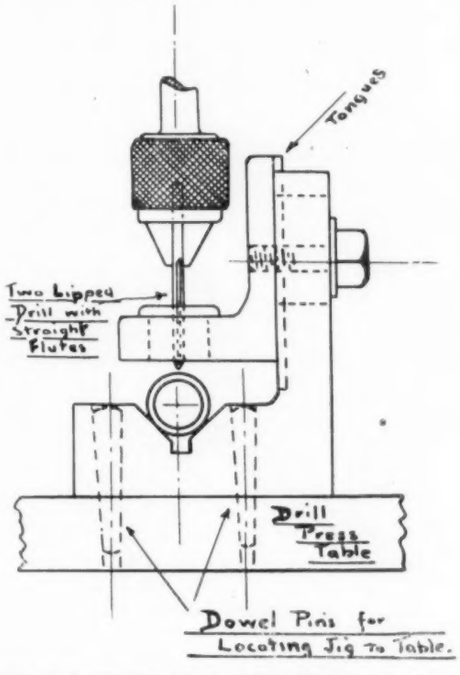
December 18, 1911.

*Electro-Chroma, THE METAL INDUSTRY, November and December, 1911.

BRASS DRILL BREAKAGE

TO THE EDITOR OF THE METAL INDUSTRY:

The writer has noted with interest your answer under Shop Problems in the November issue of THE METAL INDUSTRY to an inquiry made by a reader for a solution of expensive drill breakage in drilling No. 70 holes in ½-in. O. D. brass tubing for spray tubes. I have found that the cause of breakage is generally owing to the drill glancing off the one side of the tubing and bending the drill to the breaking point. One can readily see how easily this is brought about when you consider that the drill enters material through a surface that is cylindrical.



DRILL JIG DEVICE FOR OVERCOMING BREAKAGE OF BRASS DRILLS.

To overcome this I have found that it is necessary to use a drill press that is extremely rigid, though not necessarily of high-duty type, but rather a drill press having a heavy frame to resist vibrations caused by high speed necessary for a No. 70 drill. The spindle of the drill press should be extremely sensitive that is easy of response to the touch of the operator in feeding and not too large in bearing diameters. In conjunction with such a drill press I use a drill jig, such as is shown in the attached drawing. This should be mounted on the table of the drill press in a fixed position and be in correct alignment between the drill spindle and the guide bushings for the drill. The jig will hold the tubing in correct position for the advantageous entrance of the drill and will maintain the drill in correct position for entering the work. This jig will save both labor and drills, provided it is made accurately and rigid. A poorly made jig is of no advantage where conditions are such as exist in this case.

G. W. F.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—Will you kindly give us a mixture suitable for gas generator castings? This mixture must machine easily and test to 100 pounds pressure.

A.—The following mixture has given satisfactory results in work of the character you mention:

Copper	76
Zinc	18
Lead	3
Tin	3

—J. L. J.

BABBITTING

Q.—What is the best method of babbitting bearings?

A.—Babbitting bearings is best done with a tin base babbitt on account of its greater toughness, as the lead base babbitts are mostly all brittle. The shells, if of brass, should be tinned with half and half solder, and, if of iron, they should have recesses or buttons for holding the lining in place. In pouring the babbitt care should be taken to pour a steady stream, and too high a temperature should be avoided as this causes shrink spots in the lining. Broaching the bearing by pushing a mandrel through it makes the babbitt denser and harder.—J. L. J.

CEMENTING

Q.—Can you furnish a cement recipe that will resist hot petroleum and unite brass with glass?

A.—Petroleum under all conditions is very penetrating, more especially when hot or at the boiling point. Therefore, the substances used to resist it must be hard and solid as flint. Take three parts of rosin, one part of caustic soda to five of water, melt the rosin first, then boil together; this will make a soap, to which must be added half its weight of plaster, this cement will harden in forty minutes. Another exceedingly strong cement is one hundred parts each of white sand, litharge and limestone, combined with seven parts of linseed oil; at first the mass is soft and of little coherence, but under pressure and when thoroughly dry will become so hard as to strike fire from steel. E. W.

CLEANING

Q.—Kindly publish in your shop problems what salts to use for an electric cleaner. Our work consists chiefly of steel stampings and contain a considerable amount of mineral oil. Can this be successfully done with the electric current without using pumice stone and brush?

A.—The stampings sould be freed from oil by rotating in a centrifugal separator. After this operation they can be cleaned in the electric cleaner, details of which were given in an article published in the July, 1909, issue of THE METAL INDUSTRY.—K.

COLORING

Q.—Please give me a formula that will blue polish steel or brass without placing the articles in a fire.

A.—The following formula is commonly used for bluing steel or brass:

Hyposulphite of soda	1 lb.
Acetate of lead	½ lb.
Water	1 gal.

The solution should be used at the boiling temperature and the articles immersed until the desired shade is acquired; then dry out. The surface should be coated with lacquer or oiled with linseed oil to protect the coating. Good results are also obtained by using a solution of 8 oz. hyposulphite of soda, 4 oz. acetate of lead and 1 gallon of water.—C. H. P.

DRILLING

Q.—Having recently experienced considerable trouble in endeavoring to drill holes in glass plates on which bronze articles are stationed for display, we wish to enquire through the shop problem department for a method that will eliminate the breakage that we experience and which will accomplish the task systematically.

A.—The questioner has not stated the size of the holes or the thickness of the glass plates. However, if the plates are the average thickness the following will suit the requirements: Stick a piece of putty or clay on the part where you wish to perforate the glass, make a hole in the putty of the size required, reaching to the glass. Into this pour a little molten lead, then unless the glass is very thick the piece will immediately drop out. This will dispose of all breakage experienced and accomplish the task without wasted energy.—E. W.

ENAMELING

Q.—Do you know of a paint or an enamel that can be used to fill letters on name plates, that will dry hard enough without heat so that the plate can be buffed without dragging the paint from the letters.

A.—Sealing waxes of the various colors are the most satisfactory material to use when a hard, durable filling is required. The plates are heated by the aid of a hot iron plate, and the wax is melted in as soon as it becomes set. The plates can be polished without danger of the wax coming out. Colored enamels are largely used for the purpose. The polishing and lacquering is done previously and then the enamels are applied. They do not affect the lacquer, and the excess can be easily removed from the high surfaces with rags moistened with a mixture of equal parts of linseed oil and turpentine, using a second rag for the final wiping.—C. H. P.

FINISHING

Q.—Can you give me a statuary bronze finish on steel?

A.—Proceed as follows: Polish down your steel in the regular way to a greased wheel finish; then cleanse and copper plate in a cyanide of copper bath for half an hour or less. If you have an acid copper bath, plate only in the cyanide bath for five minutes and the balance of the time in the acid bath. After the copper deposit is obtained remove, wash well in cold water and then immerse in the potash bath for a second. Now immerse in a cold solution, consisting of sulphuret of potassium ¼ ounce to a gallon of water, for about six seconds; then remove, wash and dry out by the aid of boiling water and sawdust. When dry, brush the surface lightly with a worn or soft brass wire scratch brush to produce the tone. If not dark enough immerse for a second in the sulphuret dip; then rewash and dry out. It may not be necessary to rebrush. A little experimenting will enable you to produce any tone desired. If you find it takes too long to produce the tone, increase the amount of sulphuret to ½ ounce to each gallon of water.—C. H. P.

GAUGING

Q.—I would like to hear from some experienced person, if in their opinion a set of standard caliper gauges are essential in a jobbing shop doing mostly small work.

A.—Standard gauges are required in a jobbing shop as much as cutting tools, mandrels, chucks, or even the machines the work is produced on, and will eliminate endless annoyance. Because a set of gauges with a corrective standard for keeping them in proper adjustments, constitutes a set of working implements sufficient to meet every requirement for maintaining uniform sizes. They should be inspected at regular intervals and adjusted at a temperature of 75 degrees Fahrenheit.—E. W.

INSULATING

Q.—Will you apprise us of an inexpensive non-conductor for copper pipes.

A.—There are several commercial non-conductors on the market, but we will recommend the following for a copper pipe covering. First the pipes should receive one or two priming coats of potter's clay, mixed thin with water, and laid on with a brush. Then sifted sawdust is mixed with very thin starch, composed of two-thirds wheat starch and one-third rye starch. Then before applying wind a string spirally round the pipes, keeping the spirals about two or three inches apart to secure adhesion for the first coat, which should be about one-quarter inch thick. After this coat is set the second and third coat are applied, and so on until the required thickness is obtained. When it is all dry, two or three coats of coal tar applied with a brush will protect it if exposed to the weather.—E. W.

MOLDING

Q.—We experience considerable trouble when making hammer and vise leads in molds for that purpose from explosions and cold shuts; please advise a remedy.

A.—Many mechanics have experienced lead explosions and have had their patience sorely tried; when pouring hot lead in molds, or around a damp or wet joint to have it explode, blow out, or scatter from the effects of steam generated by the heat of the lead. This whole trouble may be avoided by keeping the moulds sizzling hot and adding a piece of resin the size of a man's thumb to the ladle and allowing it to melt before pouring.—E. W.

OXIDIZING

Q.—Enclosed is a sample of black on iron or steel. Kindly tell me how this black is produced.

A.—The gunmetal finish upon the steel buckle is probably produced by the Coslettizing method, described in the May, 1911, issue of THE METAL INDUSTRY, or by the older method of using black ozide of manganese, melted with potassium nitrate in an iron pot. The buckles are placed upon iron wires, having been previously tumbled bright by the aid of sawdust or leather scraps; then immersed in the molten mixture until the steel is darkened. They are then removed and plunged into boiled linseed oil, which should be used warm. The heat from the buckles or other articles will accomplish this when done in quantities. The oil afterwards is removed by washing in kerosene or benzine and drying out in sawdust.—C. H. P.

PLATING

Q.—Will you please answer the following questions in the Shop Problems column: (1) What is the proper amount of potassium cyanide to use per week in a solution depositing about 400 ounces of silver per week? (2) Can you give me a good test for free cyanide in a silver solution?

A.—An addition of potassium cyanide of about 5% of the weight of silver deposited should produce a normal condition of your baths. If you deposit 400 ounces per week, then twenty ounces of free cyanide should be added to make up for the loss in decomposition. In using a silver strike with plenty of free cyanide, enough cyanide should be carried in the dip to maintain sufficient free cyanide in the regular bath. Keep plenty of silver in the solution with a proportionately large anode surface and add as little cyanide as possible and you will obtain more uniform results.

Nitrate of silver is the only positive test for free cyanide. All authorities agree on this test. You must use a deci-normal nitrate of silver solution, made up absolutely accurate, and titrate with it in a given definite quantity of solution, using a graduated burette glass, one cubic centimeter of deci-normal solution of nitrate of silver being equivalent to 0.013 gram of cyanide of potassium.—C. H. P.

Q.—Please give me a formula for the crystal green finish.

A.—For a yellowish green verde the following formula gives good results:

Copper nitrate	2 ozs.
Sal ammoniac	2 ozs.
Chloride of calcium	2 ozs.
Water	1 gal.

The surface of the article should be coppered and oxidized; then the coloring mixture lightly applied with a brush, such as a painter's sash brush. After a short time stipple the surface to give the crystallized effect. If the green does not develop heavy enough after the first application immerse the article in clean, cold water and then drain well and dry without heat. This will give the required tone. Afterwards when dry, lacquer over the article; brushing sometimes removes the green. When the lacquer is dry, wax the surface by brushing with a little beeswax.—C. H. P.

Q.—Can you tell us what is the matter with our cyanide copper solution? The hook sash lifts which we are sending you were plated in five minutes, and you will note the little lumps which adhere to them.

A.—Your solution is evidently overloaded with soda salts. The use of caustic soda or lye is of no advantage in a copper solution. The decomposition of the cyanide gives sufficient soda salts without adding more cyanide to the bath. Try adding sufficient so the bath will stand 12 degrees Baumé. If the deposit is not satisfactory, add sufficient to bring it up to 14 or 15 Baume. You cannot produce a satisfactory deposit unless the bath contains enough cyanide to do the work. —C. H. P.

POLISHING

Q.—What kind of a wheel shall I use to take the dirt and oxide off of copper and make the surface fit for electrical connection?

A.—As you do not require a high luster on your copper we suggest that you purchase a sewed buff, 8 to 10 ins. in diameter from some platers' supply house (see ad. pages). Run this bluff at a speed of not less than 1,500 revolutions per minute. Also procure some tripoli in cakes and apply a little of this to the buff and polish the copper by pressure and a to and fro motion against the buff. This will give you a clean copper surface in an instant.—C. H. P.

SOLDERING

Q.—We have a large copper vessel with all seams riveted and worked. These seams, after rivetting, have to be sweated in with a solder (preferably a mixture of copper and tin, or copper, tin and lead), which must have a melting point of not less than 1,000 degrees. Can you give us the proportions required to attain this melting point?

A.—The only ductile solder with the melting point you require would be a silver solder, however, if ductility is not essential the following solder may answer your purpose:

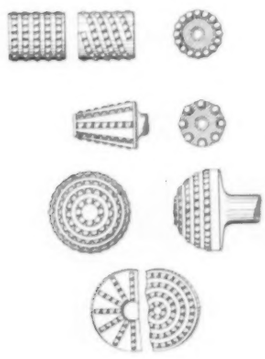
Tin	20
Copper	40
Zinc	40

—J. L. J.

PATENTS

REVIEW OF CURRENT AMERICAN PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

1,010,127. November 28, 1911. Rotary Burnishing Tool. B. F. Dingley, Silon Spring, R. I., assignor to E. C. Baker, Providence, R. I.



This is a device as shown in cut for the burnishing of the high lights or raised portions of jewelry or other metal ware. The apparatus employed for this purpose is a mechanically operated tool that is provided with balls or rounded surfaces slightly protruding from its face or periphery, so that when the work to be finished is brought in contact with the highly polished surface of said rapidly revolving balls or surfaces the combination hammering and rubbing action quickly produces the effect of an extremely high quality of hand burnished work. These improved burnishing tools may be made in any desired shape or form, such as cylinders, cones, hemispheres, disks, or any other convenient shape or shapes as may be necessary or found advantageous to operate upon work of different styles and character.

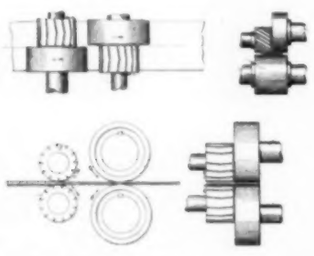
1,010,638. December 5, 1911. Electroplating Rack. J. F. Kitchen, Meadville, Pa., assignor of the Spirella Company of the same place.

This invention relates to racks or hangers for use in electroplating metal articles, and more particularly to cathode hangers for electroplating. In electroplating all bare metallic surfaces connected with the cathode and immersed in the bath or solution receive a deposit of the metal and consequently the metallic supports which hold the work or convey the current become heavily coated. This coating is practically wasted or, at least, has to be recovered at considerable expense, and in addition to this its deposition involves a wasteful consumption of current.

The object of this invention is to reduce to a minimum the bare surface of the rack as shown in cut outside of that necessary to make a proper electrical contact with the article to be plated. It also provides for holding all parts of the work to be plated practically equidistant from the anode so that all portions of the article are uniformly coated.

1,011,265. December 12, 1911. Machine for and Method of Scalping Flat Metal Bars. D. L. Summey, Waterbury, Conn., assignor to Chase Rolling Mill Company of the same place.

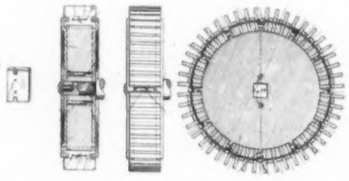
This invention relates to an improved method of and machine as shown in cut for scalping flat metal bars preparatory to rolling them, the object being to provide for doing such work effectively and rapidly with the minimum amount of power and hard labor, and with the minimum amount of wear and tear upon the machine employed.



In carrying out the method, there are employed a pair of scalping-rolls located one above the other, and a corresponding pair of scalping-rolls located one above the other, these pairs of rolls being arranged diagonally with respect to each other on the opposite sides of a line forming, as may be said, the center of the line of travel of the metal bars, also a pair of feed-rolls located one above the other, and a pair of corresponding feed-rolls located one above the other, these pairs of rolls being also located diagonally with respect to each other and on opposite sides of the said line.

1,011,323. December 12, 1911. Buffing Wheel. W. J. Courtney, Chicago, Ill., assignor of one-half to W. J. Kennedy, also of Chicago.

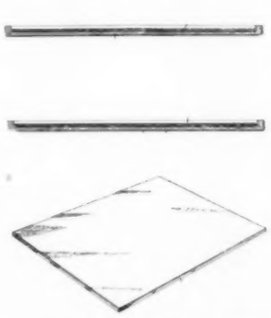
This is a buffing wheel as shown in cut designed for use in knife-polishing machines as employed in hotels and restaurants for polishing the blades of table or other knives.



The preferred form of construction of the invention comprises a substantially circular core having a square central aperture, there being diametrically opposed perforations arranged parallel to the aperture and equally spaced therefrom. A driving shaft is provided with a squared extremity which is fitted to the square aperture of the core. Arranged on the periphery of the core is a plurality of equally spaced transversely disposed radial projections, these projections serving to separate the groups of buffing-plates.

1,011,524. December 12, 1911. Method of Making Composite Metal Plates. L. B. Tebbetts, of St. Louis, Mo., assignor of one-half to Hoyt Metal Company of the same place.

This invention relates to a method whereby two metal bodies of different kinds, as shown in cut, are integrally connected in a manner to provide a most secure bond between them. In carrying out the method, a base metal made up of lead or lead alloy is melted and placed in a suitable open face mold, such as that indicated in the drawing, the molten base metal being designated. After skimming the dross or bubbles from the top of the base metal there is placed on the base metal, while it remains in a molten state, an unmolten body of facing metal, said facing metal being preferably in the form of a rolled sheet. Composed of britannia metal, or an alloy having not less than 50 per cent. of tin, or the rest antimony, copper, nickel, etc. The facing body floats on the surface of said molten base metal until it has become fused thereto and, after fusing, remains at the top of the base metal until both layers of metal have become cooled, without either metal entering appreciably into the texture of the other metal, and without either layer of metal losing its identity.

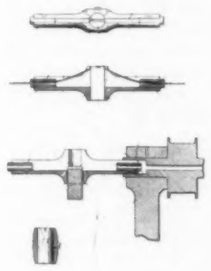


1,012,665. December 26, 1911. Process for Electroplating with Zinc. A. A. Le Mètre, Paris, France.

This invention is characterized by the employment of a cold bath of a special definite composition, the object of which is to deposit galvanically upon metal articles an adherent and penetrating layer of metallic zinc. This bath comprises the chemical compounds set forth below in the following proportions: sulphate

of zinc 12 kilos, ammonium chloride 3 kilos, sulphate of soda 2 kilos, sulphuric acid 1 kilo, water 100 liters. It should be employed in a cold state, that is to say, it should not be maintained at a temperature exceeding 30 degrees Centigrade approximately.

1,012,964. December 26, 1911. WIRE STRAIGHTENER. W. T. Ashcroft, Waterbury, Conn.

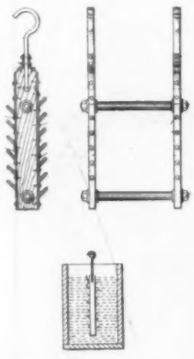


This invention relates to new and useful improvements in wire straighteners, as shown in cut, such as are used in connection with automatic wire working machines of various sorts, and through which the wire is fed from a reel.

It is the object of the invention to generally improve upon devices of this kind, and particularly to simplify and cheapen their construction so that the same can be made at a moderate cost; to provide a straightener that will operate upon different sizes of wire and turn it out perfectly straight and suitable for any class of manufacture, causing very little scrap or waste when being used.

1,010,648. December 5, 1911. ELECTROPLATING RACK. C. E. Leffel, Meadville, Pa., assignor to the Spirella Company, of the same place.

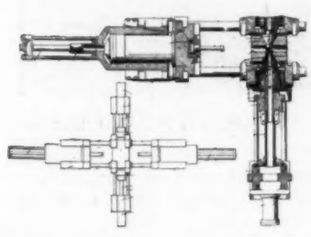
This is a rack for use in electroplating, made as shown in cut.



It consists of two similar side members and cross-connecting members. Each side member comprises a body of non-conducting material, such as wood, although if desired it may be fiber, porcelain or other non-conducting material. The cross-connecting parts are shown in the form of metal rods passing through holes in the two side member bodies and receiving nuts on their outer ends. Suitably connected to each body is a hanger in the form of a brass or copper hook for ready attachment to or detachment from the cathode conductor. On each side face of the body is a member serving as a conducting support for the article, these being in the form of strips of copper, brass or other good conducting material and having the article supports provided by bending the same to form projections preferably inclined upwardly. These members are connected to the hooks in a manner to give a good electric connection, such as by means of rivets, and are detachably connected to the insulating body, such as by means of nails or screws. Consequently, when they become excessively coated, they can be readily removed and be replaced by new strips.

1,011,522. December 12, 1911. METHOD OF AND MACHINE FOR EXTRUDING METAL. D. L. Summey, Waterbury, Conn., assignor to Chase Rolling Mill Company of the same place.

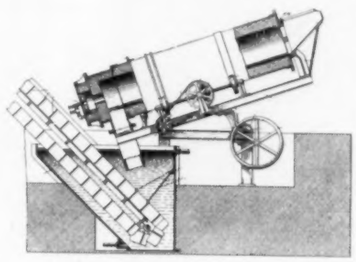
This is an extrusion machine, shown in cut, for making rods or tubes of extruded metal.



The machine is covered by 20 claims and the method by 6 of which the following gives an idea of the operation. A method of extruding metal consisting in positioning a billet-receiving chamber, then simultaneously subjecting each end of the billet to inward pressure for the extrusion of the metal through an opening in the side of the said chamber and around forming tools arranged at an angle to the line of pressure, and then retiring the said forming tools from the said chamber for the extrusion of the stump and the insertion of another billet.

A method of extruding metal consisting in positioning a billet in a billet-receiving chamber, then simultaneously subjecting each end of the billet to inward pressure for the extrusion of the metal through a die opening outward from the said chamber at an angle to the line of pressure, and then removing the stump from the said chamber preparatory to the introduction of another billet.

1,010,728. December 5, 1911. ROTARY FURNACE. E. S. Davis, Jersey City, N. J., assignor to Rockwell Furnace Company, New York, N. Y. This invention relates to a rotary furnace fired by oil or gas for the annealing, etc., of metal articles.



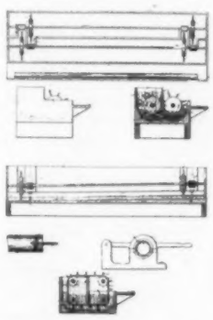
In its preferred form the invention consists of a cylindrical furnace body as shown in cut, which is mounted to rotate, and which is provided with a plain unobstructed lining. This plain lining permits articles of any irregular shape, such as bolts and the like, to be handled, and the feeding of the blanks is accomplished by tilting or inclining the furnace body. The inclined position of the furnace, together with the revoluble movement, causes the blanks to be fed forward in a spiral sort of movement. The speed of travel through the furnace, and hence the degree of heat, may be regulated by adjusting the inclination of the furnace body.

1,011,744. December 12, 1911. PROCESS FOR MAKING BIMETALLIC WIRE. J. B. Clamens, Paris, France.

This is a process for making bimetallic wire as shown in cut, containing any desired predetermined low percentage of copper

which consists in electroplating a steel disk with copper, applying to each side of said disk a sheet of copper, one sheet being thicker than the other, subjecting this compound disk to a high temperature and heavy pressure to effect a welding of the copper sheets to the steel disk, cupping the compound disk to form a socket, the thinner copper being on the inside, inserting into the interior of said socket a steel core provided with a light copper coating, reheating the ingot thus formed, rolling said ingot to reduce its diameter and effect a weld of the socket and the core, and then drawing the ingot to form a wire having a steel core sheathed in copper and provided with a copper coated steel jacket.

1,012,047. December 19, 1911. COATING OF METAL ARTICLES. M. S. Armstrong of New Kensington, Pa.



This invention relates to the coating of metal articles, and has special reference to the coating of the interior and exterior surfaces of pipes or tubes.

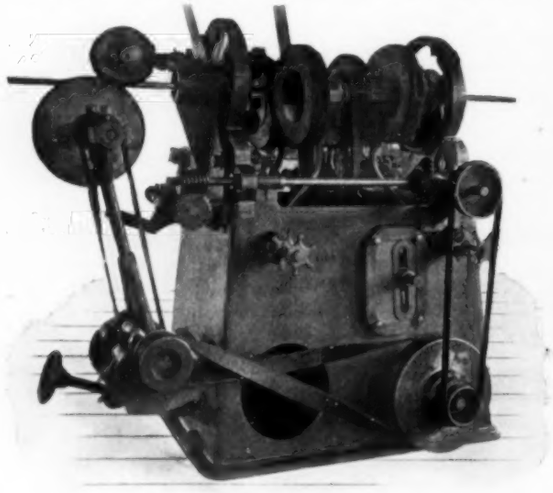
The object of the invention is to provide a cheap, simple and efficient apparatus, as shown in cut, for the coating of metal articles, such as pipes or tubes, which will enable such articles to be coated on their inner and outer surfaces in a rapid and easy manner with a metallic coating, such as lead and tin, or zinc, as well as enabling such a coating to be formed on such articles evenly and uniformly and without any waste of the material composing such coating.

INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

NEW AUTOMATIC POLISHING AND GRINDING MACHINE

In the manufacture of plumbers' supplies, metal bedsteads, brass railings, gas and electric fixtures, etc., vast quantities of brass and copper tubing and rods are used. The most, if not all, of this material has to be buffed and polished by hand at the present time. This is a very slow and expensive process, which fact has given rise to a strong demand for an automatic machine to do the work. Furthermore, there is a demand for an automatic grinding machine for tubing and rods, and this demand is even greater than that for an automatic buffing machine. In order to meet these demands, the Tube Bending & Polishing Machine Company, of Baltimore, Md., have brought out an automatic polishing and grinding machine, which is illustrated by the cut. This machine, as its name implies, is designed to do grinding as well as polishing. A few simple adjustments are all that are necessary to convert it from an automatic buff into an automatic grinder, or the reverse, so that one and the same machine may be used for both kinds of work as occasion requires.



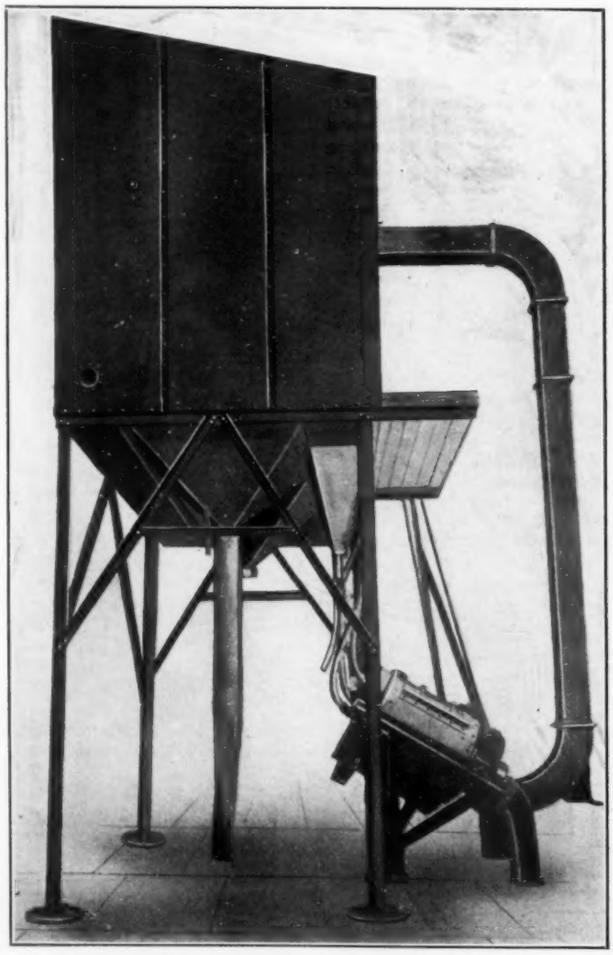
AUTOMATIC POLISHING AND GRINDING MACHINE.

As a grinder the machine will handle straight lengths of brazed or welded steel tubing, producing a smooth and uniform surface ready for plating or enameling. The difficulty and expense of doing this work by hand are enormous and the results unsatisfactory. On the contrary, this automatic grinder does the work easily and cheaply, turning out from 1,200 to 1,700 lineal feet in 10 hours, and doing it much better than it can possibly be done by hand. As regularly made, this machine will handle tubes or rods from ¼ in. O. D. up to 2¼ ins. O. D. Special attachments can be supplied for handling work of smaller or larger diameters. The tubes must be commercially straight, but need not be accurately so, since provision has been made to take care of this by mounting the buffing or grinding wheels upon flexible supports, which enable them to follow the work in case it is not absolutely straight or runs a little out of true. It is this feature, perhaps more than any other, that has made this machine a practical success.

When operated as a buffing machine the capacity is greatly increased owing to the higher speed at which it is run, and it will then buff and polish ready for plating or lacquering from 2,000 to 3,000 lineal feet of tubing in 10 hours, depending upon the size and nature of the work. Either in grinding or in buffing, the machine may be operated by one inexperienced man or boy, and it is claimed will do more work than can be done by from six to ten skilled men. The enormous saving in labor and the consequent cheapening of the cost of production become at once apparent.

NEW SAND BLAST MILL

The process of cleaning castings has improved year by year. First the scratch brush, then the stave mill, then the improved type of exhaust cleaning mill, and now the trade is asking for still better results in cleaning, which has brought about the sand blast process. The sand blast machine plays its part on heavy castings, while the sand blast tumbling barrel is put into commission on smaller castings. A new type of sand blast mill, as shown in cut, has recently been put on the market by the W. W. Sly Manufacturing Com-



THE W. W. SLY MANUFACTURING COMPANY'S SAND BLAST MILL.

pany, of Cleveland, O. The standard size of this mill is 36 ins. in diameter, and 36 ins. deep, requiring 3 h. p. to operate same.

It is stated that the capacity of this mill varies in accordance with the work to be tumbled. In the case of light, frail and open work, 300 to 500 lbs. will make up a charge, while

heavy work which will lie closer, will run from 500 to 1,200 lbs. per load. The time of blasting varies from six to fifteen minutes. Air consumption required per gun, 200 cu. ft. per minute under 40 lbs. pressure. Each mill is provided with two sand blast guns.

All parts of this mill are thoroughly protected from dust or grit, which is a very important feature in this type of equipment. There is absolutely no dust in the cleaning room while this outfit is in operation. The sand blast mill, arrester, fan, pulleys, piping, etc., are all self-contained as one unit. The outfit can be placed anywhere wherever there is enough head room.

NEW SELF-CONTAINED SAND BLAST BARREL

The sand blast barrel shown in the cut is claimed to be unique, in that it is self-contained and thus eliminates all extra apparatus for returning shot grit or sand for re-use. Because of this feature the barrel may be placed anywhere in the plant without defacing any building, and also saving floor space. Also as there is no dust when the barrel is in operation, it can be installed anywhere in the foundry most convenient for economical use.

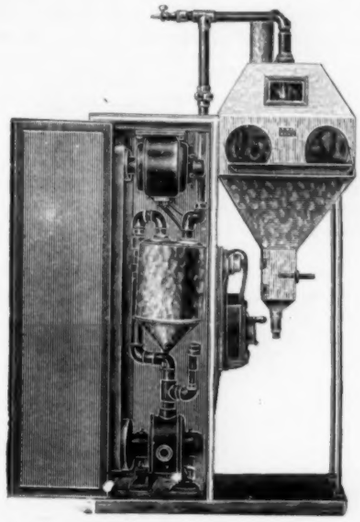
This barrel is made by the New Haven Sand Blast Company, New Haven, Conn., and is made with an inner and outer shell, the inner shell being of heavy steel, and is interchangeable. The barrel rests on four rollers and revolves two revolutions per

SELF-CONTAINED SAND BLAST BARREL.

minute, thus reducing breakage to a minimum. The back head supporting the hopper and sand nozzles remains stationary, while the barrel revolving around it carries the sand or shot up into the hopper by means of buckets between the two shells. An exhaust in the stationary head carries away the dirt from cleaned castings. Light castings may be cleaned in 5 to 10 minutes, while 15 to 20 minutes are required for heavier castings where the molding sand has been burned on harder. Further information can be had by corresponding with the New Haven Sand Blast Company, New Haven, Conn.

NEW COMBINATION SAND BLAST OUTFIT

The new combination sand blasting outfit illustrated here is especially designed to do away with the annoyance occasioned in having a lot of pipe work done when an outfit of this kind is installed. This outfit, as will be seen, is very compact and is complete, including the sand blast machine proper, the blower, motor, and pipe connections. As will be seen, the blower and motor are located in the box at the side of the sand blast to which the latter is fastened. This box has a door which may be closed while the machine is in operation, thereby protecting the machine from dust and dirt. The sand blast hood is equipped with an electric bulb so that the act of turning on the current for the operation of the machines not only starts the blower and sand blast, but also



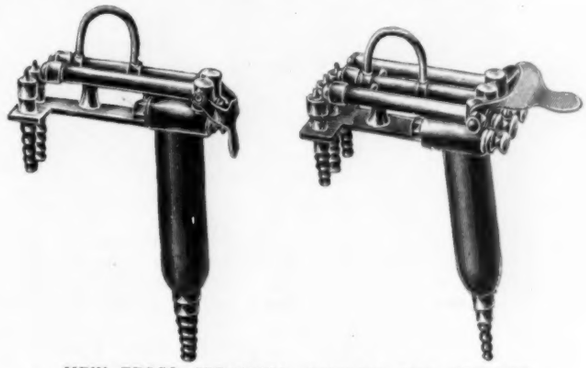
COMBINATION SAND BLAST OUTFIT.

lights up the interior of the machine so that the work may be easily seen, no matter how dark the room may be in which the outfit is located.

This sand blasting outfit is manufactured by Leiman Brothers, 62-J John street, New York, who have been manufacturing and selling sand blasting outfits for the past twenty years. It is equipped with automatic, continuous feed sand pipes, by which the same sand is used over and over again, so that a half pail of sand placed in the machine will be sufficient for operating from several days to a week, according to the kind of work done. This sand blasting outfit should find a ready field among platers, and as they are made in four or five sizes, they are well adapted for work in all sorts of metallic establishments. The sand blast is the ideal method of furnishing a superior surface for the application of electroplating. It is also used for cleaning molding sand from castings and patterns, and also for furnishing a mat finish on all sorts of metals, and for frosting glass. Full particulars may be secured in reference to these outfits or pressure blowers only, by referring to the manufacturers.

NEW EPSCO SPRAYERS

In order to fill the demand found to exist for a sprayer which will spray two or more colors without changing pots, the Eureka



NEW EPSCO SPRAYERS—DUPLEX AND TRIPLEX.

Pneumatic Sprayer Company, New York, have produced the Duplex and Triplex Epsco sprayers here shown. These sprayers

are of the identical construction of the single Epsco sprayer described and shown in the November issue of THE METAL INDUSTRY.

The Duplex and Triplex sprayers permit of as many colors being used in the same sprayer by simply having two or three pots and the hose from the sprayer leading into each pot. An article may thus be sprayed partly with one color and by shifting the thumb to the next valve button a different color will be brought up. In painting or otherwise finishing manufactured articles, surfaces do not always run of uniform size. For instance, a table with its broad top and slender legs, or machinery with the same relative variance in surface. There has therefore been a call for a spray which will cover wide surfaces and at the same time may be used for the more slender parts.

As the operator arrives at that portion of the article which requires a smaller spray, the clamp is pushed up and the thumb used on the individual buttons. Thus we have a sprayer capable of delivering one, two or three jets at a time at the will of the operator, this construction being such that little or no care is required. The sprayers being so strong and compact, as to withstand a great deal of hard usage, yet being so light that they are not tiresome to the operator's arm and wrist, and the fact that no reservoir is attached permits them of being turned upside down at will.

The price of these sprayers is moderate, being $5 for the single, $9 for the double and $13 for the triple. A large stock of sprayers, air compressors, air filters, air tanks, fixtures, hose, etc., are at all times on hand in the New York warerooms, 276 Spring street, New York City.

A NEW MOLDING MACHINE

The Osborn drop-plate squeezer, made by The Osborn Manufacturing Company, Cleveland, Ohio, and New York, represents revolutionary improvements in the squeezer-type of molding machines. The makers say that it is the only drop-plate machine made with squeezer attachment so that it can be used in three different ways and practically combines the advantages of three machines in one. It consists of a molding-machine proper, mounted on a wheel-base with a strong squeezer attachment. The machine is similar in type and construction to the well-known Osborn Adjustable Flask-Strippers, and possesses all of their advantages. These machines have a uniform maximum pattern-draw of six inches, and are readily and quickly adjustable to a large range of flask sizes. The patterns are mounted on plates which drop directly from the flask, drawing both pattern and pins in one operation.

OSBORN DROP PLATE SQUEEZER, CLOSED FOR MOLDING.

In the case of many jobs this obviates the necessity of using expensive individual stripping-plates for each pattern. On the other hand, the machine is so constructed that it is perfectly adapted for use with stripping-plates when the job is such as to make them necessary. The draw is accomplished by a half-turn of the handle, the guides to the pattern-carrier assuring perfect accuracy. The squeezer attachment, as may be readily seen from our illustration, is simple, strong and efficient. Powerful leverage combined with a folding toggle which brings the head down directly upon the flask assures sufficient pressure with the least possible effort on the part of the operator. The springs shown in the lower portion of the illustration operate to hold the squeezer attachment back out of the way when the flask is being filled, they also act as a counterbalance to the squeezer head as it is moved forward and back.

The Osborn drop plate squeezer is made with plain base as well as with the wheel-base shown in the illustration. The portable or wheel-base machine will be found a great convenience by many foundries, as it enables the machine to be readily moved from place to place. The wheels are strongly made with extra wide rims, which will not cut into the foundry floor, and special enclosed bearings which positively exclude sand and grit. The Osborn drop plate squeezer is made in two sizes, A-150 and A-151, each of which can be furnished either with or without the wheel-base. The larger of these two sizes takes flasks ranging from 13 inches to 16 inches in width any length up to 21 inches, the smaller sized machine takes flasks 9 inches to 12 inches in width any length up to 21 inches. Above are inside flask dimensions, both sizes of machines will admit of flasks having a maximum length of 27 inches outside. In each case the maximum pattern draw is 6 inches.

OSBORN DROP PLATE SQUEEZER, OPEN, SHOWING MOLD.

Additional information will be furnished by the manufacturers.

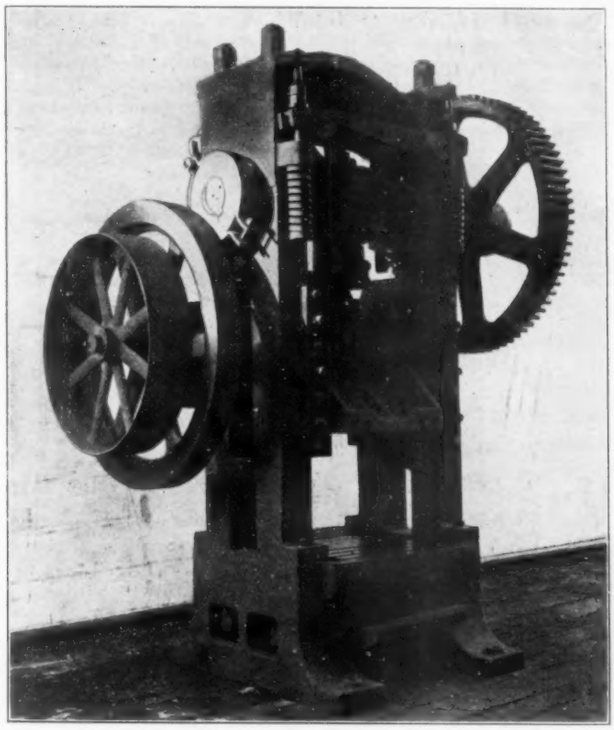
SPOTLESS ELECTRIC CLEANING COMPOUND

Frederic B. Stevens, manufacturer of foundry supplies, etc., Detroit, Mich., is making some strong claims for the Spotless Cleaner, prepared and sold by him. He says that "Spotless Cleaner does not emit the poisonous and dangerous gases so prominent in many other electric cleaners on the maket. Its use does not effect the polished surface and the 'color attained' by the polisher is left undisturbed on the face of the castings to be plated. The grease and scale are removed through the formation

of a gas which is given off from the surface of the article. This gas actually forces off the grease and scale that are on the surface." The strength of the solution should stand about 4 degrees Beaume's acid hydrometer, which will require about ½ pound of cleaner to each gallon of water. About one and a half volts are required to electrolize or dissolve this compound. To this voltage sufficient current must be added to overcome resistance of conducting wires and rods and to cover the surface of the article to be cleaned. Spotless electric cleaning compound is sold in barrels of about 300 pounds and at the seller's risk. If it does not give satisfactory results a trial costs nothing and the material may be returned. Price in barrel lots 3 cents a pound, f. o. b. cars, Detroit, Mich.

NEW SINGLE CRANK PRESS

The cut shows a heavy single crank press of new design, recently built by the A. Garrison Foundry Company of Pittsburgh, for trimming nickel steel forgings for six-throw automobile crank shafts. The machine, however, is designed for all kinds of work, in both hot and cold metal. A press used for drop forging work is generally placed as close to the hammer as possible, and often between two hammers. It is, therefore, desirable that its origin should be such that



SINGLE CRANK PRESS FOR TRIMMING HEAVY METAL FORGINGS.

it can be partially dismantled if necessary without dismantling surrounding wires, pipe or machinery. This condition is well met by presses with built-up housings, in which through bolts run from top to bottom and take the strain of the work, inasmuch as the top cap can be raised and the crank shaft can be lifted without disturbing anything adjacent, whereas in solid housing presses the shaft must be pulled out sidewise.

The housings of this press have accordingly been made of the built-up type. It is also obvious that these rods will stretch or break should the press be overloaded or its action obstructed, thereby saving much time and expense. Another new feature is the counterbalancing of the head by spring levers, following the same general design used on a double crank forging press, described in our issue of January 12, 1911. The use of spring instead of counterweights reduces the weight of the moving parts very considerably, and, therefore, their inertia and the pound on the clutch when starting the machine. The crosshead is of steel, the gears of steel with cut teeth. The clutch is of the automatic crab type, and is driven by a square shank forged solid upon the shaft, no keys being used.

MULTIPLE DRILL FOR DRILLING METAL PLATES

We illustrate in Fig. 1 a large size multiple drilling machine of the raising table type. It was adapted in this case for drilling meat cutter plates and was equipped with six interchangeable heads, each with a different layout of spindles and a table fixture for locating, holding and indexing the cutter plates during the process of drilling the holes. Fig. 2 shows five of the interchangeable drilling heads. The sixth head is shown in the machine with a drilling steady jig attached. Each head is furnished with a four-leg cradle for safe keeping when not in use and also to facilitate handling and adjusting them to and removing them from the machine. The drilling heads are self-contained and are easily and quickly interchanged by means of the cradles.

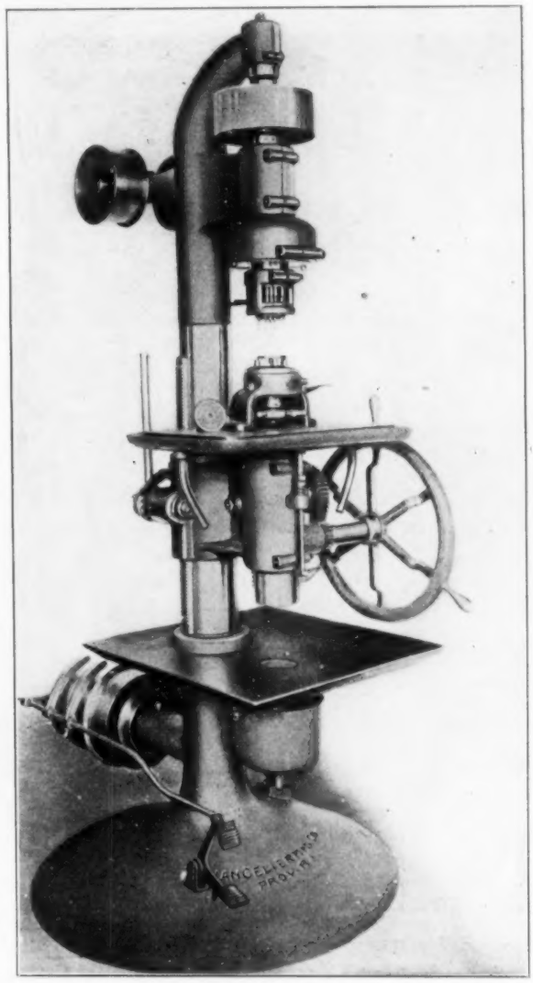


FIG. 1. THE MULTIPLE DRILL FOR DRILLING METAL PLATES.

The heads and spindle drivers are made of the best brand of bearing phosphor-bronze and the drilling spindle holes are bored to within a .0005 inch limit as to location. The spindles are of tool steel and cut out of the solid bar. They are hardened, tempered and ground true to size and are fitted with pinch chucks for taking listed straight shank tongued wire twist drills. The steady jig mentioned is clamped to the lower end of the drill head and is adjustable vertically to allow the cutting end of the drills to project out just sufficiently to drill through the cutter plate. The steady jig shown is used on the four smaller heads, the only change required being the exchanging of steel

plate containing the jig bushings that are held in place in the lower opening of the steady jig by screws. Other heads with layouts of spindles that can be arranged within a 5-inch circle can be used in this machine. The drill head casing is removable and other casings may be fitted to take in larger heads in which the spindle layouts are not larger than a 11-inch circle.

The main driving spindle is 1 5/16 inches in diameter and runs in loose perforated bushings in both upper and lower bearings, thereby increasing its resistance to wear and heating up at the high speed at which it runs. Lubrication to all high running parts

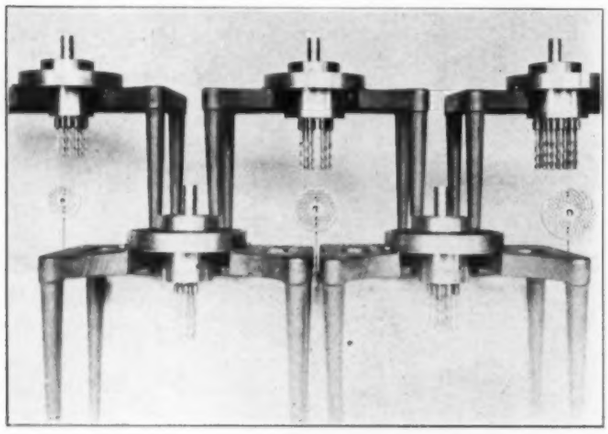


FIG. 2. SHOWING FIVE INTERCHANGEABLE DRILLING HEADS OF THE MULTIPLE DRILL.

connected to this spindle is affected through a capped oiler screwed into the upper end of the main spindle, the oil leading down through a hole drilled the entire length of the main spindle to the drilling head.

The oil in gravitating and by its centrifugal tendency lubricates the upper and lower bearings. A separate oil well is also provided for the upper bearings.

The raising table has a working surface of 12½ x 20 inches and has an oil run on all sides with an outlet on each end leading to the oil pan beneath. The table has a feed of 9 inches and is actuated by an 18-inch hand-wheel through a pair of gears and pinion and rack. The leverage ratio of the table feed is 30 to 1. A stop screw is provided for drilling the required depth. The distance from the lowest position of the table to the end of the drills is 10 inches. The distance from the main spindle center of the table to the inner side of the column is 6⅞ inches. The table supporting arm is adjustable and can be clamped at any height required. The supporting arm is raised and lowered by means of the ratchet-pawl and rack-pinion method, and is located on the left-hand side of the machine.

On the table in Fig. 1 is shown the cutter plate fixture. It is centralized with drilling head and is fastened to the table by screws. The functions of this fixture are locating, holding and indexing the cutter plates for the operations in drilling. An expanding arbor projecting above the top face of the indexing head of fixture both centralizes and holds the cutter plate by means of the hole in its center. The cutter plate is seated on three short steel posts on indexing head. The arbor is expanded by means of spoked hand-wheel seen in front opening of fixture. An indexing head and expanding arbor are required for each plate and are easily and quickly interchanged. The indexing head of fixtures is moved by hand and is locked by a locking pin that is actuated by a downward pressure on small lever at the right. Cutting oil is supplied to the drills by an oil pump. The oil after usage, gravitates into the lower oil pan and is filtered twice before entering the supply oil tank to be ready for use again. On the base of the machine is located the tight and loose pulleys, the pump and driving pulley for the quarter-turn belt. All these pulleys run on a trunnion shaft driven into hub on the base. All these pulleys, also the quarter-turn pulleys, are fitted with a foot belt shifter. The specifications of this machine are:

The main spindle and drill head spindles run at 800 r. p. m.; floor space 33 x 42 ins.; height 6 ft. 8 ins.; net weight about 1,750 lbs.; domestic shipping weight about 1,950 lbs.; foreign shipping weight about 2,494 lbs.

While the machine above described was designed for the drilling of meat cutter plates it can be and is used for the multiple drilling of copper, brass and aluminum plates. These machines are manufactured by the Langelier Manufacturing Company, Providence, R. I., who will gladly furnish catalogues.

A CONDENSER TUBE FOR MARINE WORK

In marine work there has always been a need for a condenser tube that had a reasonably high coefficient of heat transfer and could successfully withstand the corrosive action of the salt water used for cooling purposes. Therefore the tests made on a "Monel Metal" condenser tube by George A. Orrok, and presented in his paper on the "Transmission of Heat in Surface Condensation," read before the American Society of Marine Engineers, are of considerable interest, as the "Monel Metal" tube showed a coefficient of heat transfer of .75 in comparison to copper's 1.00, but the great advantage of the "Monel Metal" tube is that it is less corrodible than bronze, as strong as steel, and the finish is similar to pure nickel.

Brass condenser tubes for protection are often tinned on the inside or both sides. Not only does this lower the coefficient of heat transfer, but also bimetallic tubes are apt to split. The "Monel Metal" tube is made in one piece, thus eliminating this drawback. It is a fact that corrosion, oxidation, vulcanizing, pitting, etc., reduce remarkably the heat transferred, therefore a tube of "Monel Metal" will stand up to its work and will not have to be often replaced, as is the case with tubes that can not withstand the corrosive effect of salt water. Monel Metal tubes consist of 67 per cent. nickel, 27 per cent. copper, and 6 per cent. of other metals. The results of the tests of Mr. Orrok on "Monel Metal" condenser tubes are given above.

TESTS OF HEAT TRANSFER THROUGH "MONEL METAL" CONDENSER TUBE.
MADE WITH DRY VACUUM LINES ONLY SLIGHTLY OPEN.

Test No.	Cir. Wtr. Per Hr. Lb.	Stm. Con. Per Hr. Lb.	Ratio of Wtr. to Stm. Q.W.	Vol. of Wtr. in Tube ft. per Sec.	Abs. Pres. in Con. In., of Mercury.	Temp. of Stm. Deg. F.	Temp. of Inlet Wtr. Deg. F.	Temp. of Outlet Wtr. Deg. F.	Temp. Rise of Wtr. Deg. F.	Mean Tem. Diff. Lag. Fahr. Arith.	B.T.U. Per sq. ft. per hr. per Deg. Mean Tem. Diff.
446	8925	57.1	156	8.81	3.51	119.6	40.58	47.13	6.55	75.7	773
447	8810	68.2	129	8.70	5.01	133.3	40.80	48.68	7.88	88.6	783
448	8970	91.0	98.5	8.85	10.08	161.5	40.80	51.03	10.23	115.6	794
449	8840	107	82.5	8.74	14.96	178.5	40.50	52.5	12.0	132.0	805
450	8970	128	70.0	8.85	22.98	198.1	40.15	54.13	13.98	151.0	830
451	8810	126	70.0	8.70	23.01	198.1	40.0	54.0	14.0	151.1	817
452	9000	107	83.8	8.89	15.01	178.1	40.8	52.6	11.8	131.4	807
453	8890	89	100	8.77	9.95	160.5	41.13	51.2	10.07	114.3	792
454	8890	66.3	134	8.77	5.00	133.1	41.55	49.13	7.58	87.8	768
455	9040	55.4	163	8.92	3.42	118.8	40.95	47.25	6.30	74.7	762

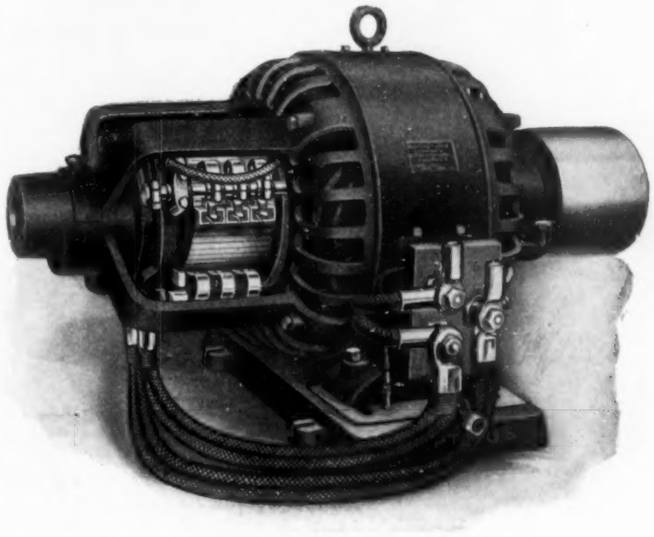
Monel Tube 1 in. Outside Diameter. 18 B.W.G.

NEW TYPE OF ELECTRO-PLATING DYNAMO

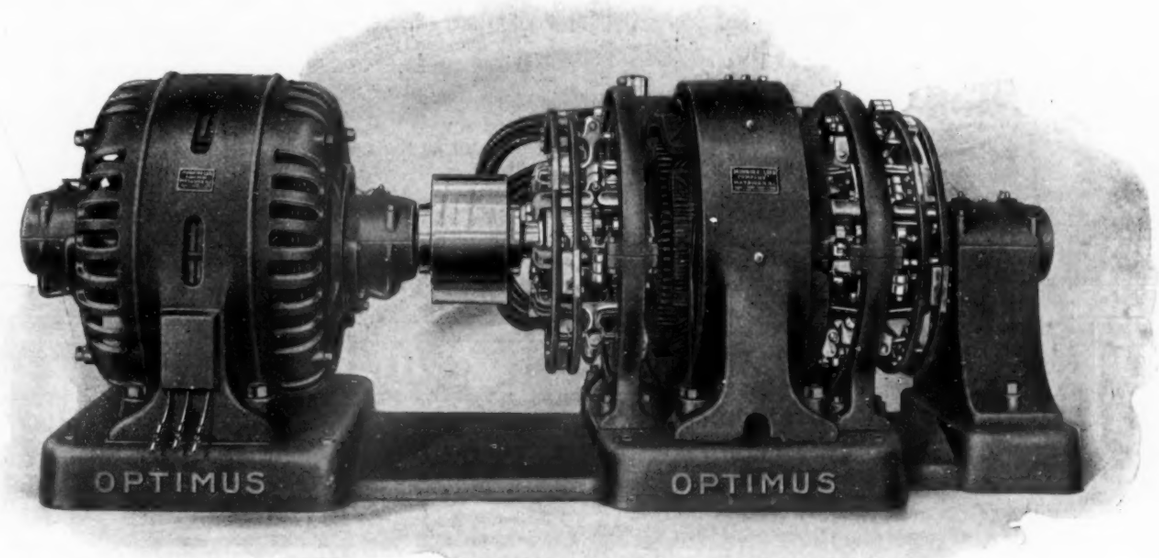
A new type of low voltage dynamo suitable for electro-plating and electrolytic work has just been brought out by the Munning-Loeb Company, of Matawan, N. J. These machines, which are known as Optimus dynamos, embody many novel features, which will be of interest to practical electro-platers. In the first place, a glance at the several photographs of this machine, shown herewith, will show that these dynamos are designed along modern lines, and have pleasing outlines which conform with the design of other modern electrical apparatus. Except in the smaller sizes, Optimus dynamos are of the multi-polar type, thus securing a much better magnetic distribution and higher efficiency than is possible with the bi-polar type.

The Optimus dynamo is compound wound, gives a practically constant voltage from no load to 25 per cent. overload. This remarkably constant line voltage is automatically maintained by means of a special compound winding, and is not secured by any manual shifting of field rheostats. This uniform voltage characteristic makes it possible for the plater to throw different tanks in and out of the circuit at will, without having to worry about its affecting the voltage of the dynamo. There is thus never any danger of burning the edges of the work due to short periods of high voltage, nor is the work unnecessarily retarded by slow deposition of metal due to low voltage. The compound winding also maintains a fixed neutral position for the brushes on the commutator, so that sparkless commutation is secured without shifting of the brushes with changes in load.

dynamo is wound for either two or three-wire circuits. They are also furnished in all sizes from 300 to 50,000 watts.



TYPE BH, 750 AMPERE, 6 VOLT, 2 WIRE, BELT DRIVEN "OPTIMUS" PLATING DYNAMO.



"OPTIMUS" DOUBLE COMMUTATOR, END PEDESTAL TYPE, ELECTRO-PLATING DYNAMO, GIVING 5,000 AMPERES AT 6 VOLTS, OR 2,500 AMPERES AT 12 VOLTS.

The brushes are made of a special carbon composition, and are held against the commutator by means of an adjustable clock spring. A flexible braided copper cable carries the current away from the brushes, and thus provides a constant contact instead of the sliding contact so often depended upon. These brushes bear radially upon the commutator, and it is claimed that they can be used for their entire length and that they will not score or cut the commutator as usually happens when copper gauze brushes are used. Furthermore, the fact that the carbon brushes bear radially and not tangentially insures that they will always remain at the neutral point. When a brush bears tangentially and the end is gradually worn off, it keeps moving back further and further on the commutator, and if sparkless commutation is desired, it has to be shifted forward occasionally. The Optimus plating

KEYSTONE EMERY PROCESS

Keystone emery, the product of the Keystone Emery Mills of Frankford, Philadelphia, Pa., is claimed by the makers to be the best graded, fastest cutting, and the most symmetrical finished and serviceable emery in the world. This degree of excellence is obtained, the company says, by their scientific method of crushing the ore. By this method of disintegration, the adhesive cement by which nature binds the little crystals together in the solid mass seems to be destroyed, loosening its grip and letting the crystals fall apart in their natural shape and condition. The crystals thus produced are perfectly natural and possess all the qualities valuable for abrasion purposes. Further information and samples upon request.

ITEMS OF INTEREST TO THE INDIVIDUAL.

William R. Mample, of the Aluminum Castings Company, has been transferred from Detroit to Fairfield, Conn.

William Hoeltke has become connected with Freis & Company, Buffalo, N. Y., in the capacity of brass finisher.

George Nahrgang, formerly foreman plater for the Hahn Brass Company, New Hamburg, Ontario, has accepted a similar position with the Otis-Fenson Elevator Company, Hamilton, Ontario.

Alfred Pritchard has resigned his position as foreman plater for the Elite Novelty Company, of Winsted, Conn., and is now connected in the same capacity with the J. L. Mott Company, of Trenton, N. J.

Holmes C. Walton and A. C. Firth, who are interested in "Voltite," the plating powders described in the July, 1911, issue of THE METAL INDUSTRY, are now in New York for an extended visit.

John George Niederer, who is known all over the world as an expert on the "Cire Perdue," or Lost Wax Process, has accepted a position as superintendent of the Gibson Gas Fixture Company, of Philadelphia.

Hubert D. Coleman, the melter and refiner at the Philadelphia Mint, does not expect to be affected by the transfer of his department to New York, as he will be kept busy melting and pouring nickel and bronze alloys.

H. H. Moore, who had charge of the office of the Cincinnati Punch & Shear Company, and who later came to The Iron Punch & Shear Company, successors of the above company, has severed his connection with the latter company.

J. M. Dunn has resigned his position as foreman plater with The Williams Brothers Mfg. Company, Glastonbury, Vt., and has accepted a position as foreman of the plating and finishing departments of Factory C, International Silver Company, at Bridgeport, Conn.

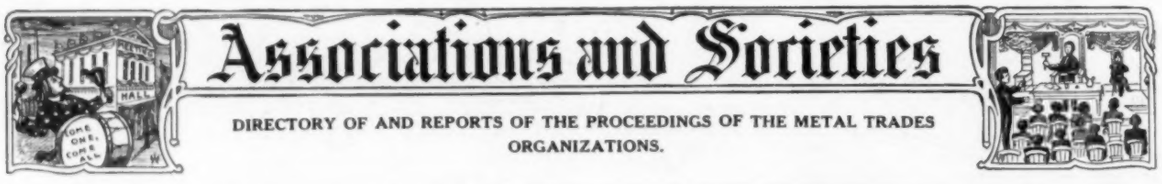
Sherard Cowper-Coles has now started private laboratories at 1-2 Old Pye street, Westminster, London, which are being fitted up specially for electro-chemical and metallurgical work, including electric furnace-work, for which a 100 h. p. transformer is being installed.

August G. Hoffmann, the well-known contributor to the columns of THE METAL INDUSTRY, has severed his connection with the firm of A. G. Hoffmann & Co., platinum depositors, Jersey City, N. J., and has accepted a position as foreman plater in Baltimore, Md., where he is working with mechanical plating barrels on steel belt buckles, finishing them in gold, silver and copper oxidize, gun metal, brass and royal copper.

DEATHS

As we go to press we learn of the death of Richard T. Crane, head of the Crane Company, valve manufacturers, at his home in Chicago, and of Franklin Farrel, president of the Farrel Foundry and Machine Company, Ansonia, Conn.

Philip H. Walter, vice-president of the Diehlmann-Walter Manufacturing Company, brass finishers, Louisville, Ky., died at his home on December 16 at the age of sixty-eight. Mr. Walter, who was a native of Germany, came to this country when a boy and learned the brass finishing trade, and several years ago became vice-president of the concern mentioned above. He is survived by his wife, two daughters and a son.



Associations and Societies

DIRECTORY OF AND REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

AMERICAN BRASS FOUNDERS' ASSOCIATION

President L. W. Olson, Mansfield, Ohio; Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 1155 Sycamore street, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities as invited. The next convention will be held at Buffalo, N. Y., propably in June, 1912.

Secretary Corse says: The American Brass Founders' Association has just closed the most successful year in its history. We have a membership now of about 300, which is showing a normal increase from month to month. The annual convention at Pittsburgh brought out some of the ablest papers that we have had so far, and the inauguration of the bound volume last year seems to have met the approval of the membership, for over half of our members have subscribed for a bound volume for the current year.

It is possible to find in many of the largest libraries in the country, complete sets of our transactions, showing that their value has been recognized. Our Committee on Papers for the coming year (F. O. Clements, Dayton, Ohio, chairman) has already the promise of many valuable papers, and these, together with the abstracts, which are now being printed in a size to be bound with the transactions, will make a volume almost double any of the previous ones.

In order to properly take care of this large increase in the amount of printed matter, it is very necessary that our membership show at least a normal increase, and it is earnestly

requested that every member of the association bring to the attention of those who might be interested, the good work that it is possible to do with the backing of a large membership. Anyone interested in the production or working of the non-ferrous alloys, is eligible to membership, and for the relatively small outlay, it is quite certain that ample returns will be received. Financially, the association is in better shape than ever before, and if the rapid growth of the past few years can be continued, we will rank among the prominent scientific associations of the country.

I should like to call attention to the abstracts which we are publishing at intervals during the year, for these carry to our members condensed information that is not possible to get readily in any other form. The average foundryman does not have access to the various scientific abstract journals, and if he does, he does not take the time to cull out just the information that he is looking for. When we found that the Bulletin was a success, we decided to print it in such a shape that it could be a permanent record. Volume 6 of the transactions will, therefore, contain all the abstracts at the end of the regular proceedings.

AMERICAN FOUNDRYMEN'S ASSOCIATION.

President, Joseph T. Speer, Pittsburgh, Pa.; Secretary and Treasurer, Dr. Richard Moldenke, Watchung, N. J. All correspondence should be addressed to the secretary, Dr. Richard Moldenke, Watchung, N. J. The objects of the Association are for the educational welfare of the iron and metal industry. Annual convention the latter part of May or early in June each year, in a succession of cities, as invited. The Convention of 1912 will be held in Buffalo, probably in June.

Secretary Moldenke reports: The work of our Association during the past year has been limited to the preparation for publication of the remarkably large and varied series of papers presented at the Pittsburgh Convention. The molding sand tests have been going on right along, a large series of mineralogical determinations of the samples having been made through the courtesy of the Ohio State Geological Survey. Micro-photographs of these samples are under way now —there being about a hundred samples. A very heavy correspondence has been going on in connection with cupola melting practice, the secretary having been called upon to deliver a series of addresses along that line all over the country.

The preparations for the Buffalo convention have commenced, the date will be announced shortly, this being held open as yet to afford the exhibitors time to make the best possible arrangements for their convenience. Likely the middle of June will be taken, as this will also be gratifying to the visitors on account of the weather conditions of Buffalo. The current volume for the year will be completed shortly, bound, and distributed. It will form the largest volume ever issued by the Association, and is a mine of valuable foundry information.

INSTITUTE OF METALS

President, Professor W. Gowland, F. R. S.; Treasurer, Professor Turner, M. Sc.; Secretary, G. Shaw Scott. All correspondence should be addressed to the Secretry, G. Shaw Scott, M. Sc., Institute of Metals, Caxton House, Westminster, S. W., London, England. The objects of the Institute are for the educational welfare of the metal industry.

The year 1911 has witnessed considerable and important advances in the undertakings of the Institute of Metals. By far the most important feature of the Institute's work has been the commencement of actual experimental work by the Corrosion Committee. In January, 1911, Dr. Bengough presented a report at the request of the committee, which contained a detailed review of the existing literature on the corrosion of copper and brass, together with suggestions for the first experiments and research to be carried out under the control of the committee. This report, together with the discussion thereon, was printed in full in the *Journal of the Institute of Metals*, No. 1, 1911, volume V, pages 20 to 114 inclusive.

During the year there has been a steady increase in the membership of the Institute. The number of members on the roll of the Institute on December 31, 1911, was as follows:

Fellow	1
Honorary members	3
Ordinary members	555
Student members	27
Total	586

On December 31, 1908, the end of the first year of the Institute's existence, the membership was 355, this having risen to 505 in 1909, and to 551 in 1910.

Three general meetings have been held during the year, and these have been described in THE METAL INDUSTRY.

The London meeting was held at the Institution of Mechanical Engineers, Storey's Gate, Westminster, S. W., on Tuesday, January 16, and Wednesday, January 17, 1912, when the president-designate (Professor W. Gowland, F. R. S.) delivered his inaugural address on the subject of "Copper and Its Alloys in Early Times." Among the papers may be mentioned the following: "Properties of Certain Copper Alloys at High Temperatures," by G. D. Bengough, M. A.; "Further Experiments on the Inversion at 470 degs. C. in Copper-Zinc Alloys," by Professor H. C. H. Carpenter, M. A., Ph. D.; "The Influence of Oxygen on Copper Containing Arsenic or Antimony," by R. H. Greaves; "The Nomenclature of Alloys," by Dr. W. Rosenhain, B. A.; "Poisoned Brass, and Its Behavior When Heated in Vacuo," by Professor T. Turner, M. Sc.; and a paper by Dr. Carl Benedicks, of the University of Stockholm, dealing with some novel experiments on a zinc-antimony alloy. The latter paper, the second to be contributed by a foreign member of the Institute in the past three months, is unique in the literature of British learned societies, as it contains illustrations in color reproduced by autochrome (natural color) photography.

G. SHAW SCOTT, Secretary.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS

President, Theo. Ahrens, Louisville, Ky.; Commissioner, William M. Webster, Chicago, Ill. All correspondence should be addressed to the Commissioner, William M. Webster, 1112 Schiller Theater Building, Chicago, Ill. The objects of the Association are to promote in all lawful ways the interests of firms engaged in the manufacture of brass goods. Meets every three months. Each meeting fixes the place and date of the meeting to follow, consequently there is no stated place. It has been customary for the Association to hold its Annual Meeting in New York City in December of each year. The Semi-Annual Meeting is generally held at Atlantic City or some other Sea Coast town.

THEODORE AHRENS.
Re-elected President of the Association.

The National Association of Brass Manufacturers held its annual meeting at the Hotel Astor, New York City, December 13 and 14. The meeting was well attended and among other matters taken up for consideration, the following resolution was passed:

WHEREAS, The making of net prices is harmful, tends to demoralize the market and drive prices and values to a lower level, therefore, be it

RESOLVED, That the National Association of Brass Manufacturers hereby agrees to discountenance and discontinue the making of net prices in so far as it lies in their power to do, and to urge all manufacturers to discourage and discontinue this harmful method

of doing business, and instead to quote, sell and invoice their goods from the regular lists and discounts, as has been the custom for years.

The following officers were elected for the ensuing year: Theodore Ahrens, Louisville, president and chairman board of trustees. Trustees: A. S. Hills, Haydenville, Mass.; D. H. Roberts, Detroit, Mich.; C. C. Hale, New Haven, Conn.; W. H. Wasweyler, Milwaukee, Wis.; Fred Sommerville, Toronto, Can.; J. W. Sharpe, Jr., Philadelphia, Pa. H. M. Hoelscher, delegate to the national committee; W. M. Webster, commissioner. The meeting adjourned to meet in Chicago on March 19 and 20, 1912.

ASSOCIATED FOUNDRY FOREMEN

President, Robert B. Thompson; Secretary and Treasurer, Hugh McPhee. All correspondence to be addressed to the Secretary, Hugh McPhee, 50 Cottage Place, Tarrytown, N. Y. Annual Convention with the American Foundrymens' Association.

The twentieth annual meeting of the Philadelphia Foundrymen's Association, Philadelphia, Pa., was held at the Manufacturers' Club, January 3. A supper was served and a paper was read by H. Caird, chief electrical engineer of the Excello Arc Lamp Company, on "Foundry Illumination with Reference to the Flaming Arc Lamp." The officers that served during 1911 were all re-elected. They are: President, Thomas Devlin, Thomas Devlin Manufacturing Company; vice-president, E. E. Brown, E. E. Brown & Company; treasurer, Josiah Thompson, J. Thompson & Company; secretary, Howard Evans, J. W. Paxson Company; executive committee, Walter Wood, R. D. Wood & Company; Thomas M. Eynon, The Eynon-Evans Manufacturing Company; H. L. Haldeman, Pulaski Iron Company; Walter T. MacDonald, Schaum & Uhlinger Company; Walter S. Bickley, Penn Steel Casting and Machine Company, Chester, Pa.; trustees, Thomas Devlin, president; Josiah Thompson, treasurer; Howard Evans, secretary; official chemist, George C. Davis.

AMERICAN ELECTROCHEMICAL SOCIETY

President, W. R. Whitney; treasurer, Pedro G. Salome; secretary, Joseph W. Richards. All correspondence should be addressed to the secretary, Joseph W. Richards, Lehigh University, S. Bethlehem, Pa. The objects of the society are to promote the theory and practice of electro-chemistry and electro-metallurgy.

Secretary Richards reports that the society has prospered greatly in 1911. It has held its two regular meetings, which were most successful ones. The spring meeting was held in New York City, April 6-8, with an attendance of 361, at which 28 papers were read and discussed, and a most enjoyable time was had. The transactions of that meeting, issued as Volume XIX, comprised 390 pages, and was issued in July.

The fall meeting of the society was held at Toronto, Canada, September 21-23, and although not so numerously attended as the spring meeting, was highly successful, for interesting papers, visits and social features. The transactions of that meeting are in press, and will be issued as Volume XX, comprising 500 pages, and is one of the most interesting and valuable volumes which the society has yet issued.

The membership of the society December 1 was 1,327, an increase of considerably over 100. The financial affairs of the society are flourishing, and it is fulfilling the objects with greater efficiency and enthusiasm at the present time than ever before.

AMERICAN SOCIETY FOR TESTING MATERIALS

President, Henry M. Howe, New York; secretary-treasurer, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa., to whom all correspondence should be addressed. The society is affiliated with the International Association for Testing Materials and is a corporation formed for the promotion of Knowledge of the Materials of Engineering and the Standardization of Specifications and the Methods of Testing. Meets annually, the time and place being fixed by the Executive Committee.

Secretary Marburg in reviewing the work of the society for the past year says: "It is gratifying to record, first, that notwithstanding the doubling of the dues a year ago, the rate of growth of the society has been consistently maintained, its present membership being, in round numbers, 1,400. During the past year the society has also established a high-water mark in its publications. These include, first, the Year-Book (385 pp.), containing the 39 Standard Specifications and Methods of Tests adopted by the society; the personnel of the 33 standing technical committees, and miscellaneous matter; second, the Proceedings, now in press, in the form of a volume of 880 pages, and containing one-fourth more matter than the largest volume previously issued; and, third, an index, now in preparation, covering the first ten volumes of the Proceedings.

"The activities of the society will center this year around the Sixth Congress of the International Association for Testing Materials, which will be convened in New York City on September 3, 1912. The objects of the association, and therefore of the Congress, are: Improvements in the methods of testing materials of construction; the investigation of those properties of materials which are of industrial usefulness; the devising of tests which will serve as a true measure of the industrial value of such materials for various purposes; the unification of methods of testing throughout the world; and the introduction of standard international reception specifications for materials with a view of facilitating international commerce. Twenty-eight countries are included in the membership of the association, of which twenty-three are represented in its council."

ELECTRO-PLATERS' ASSOCIATION

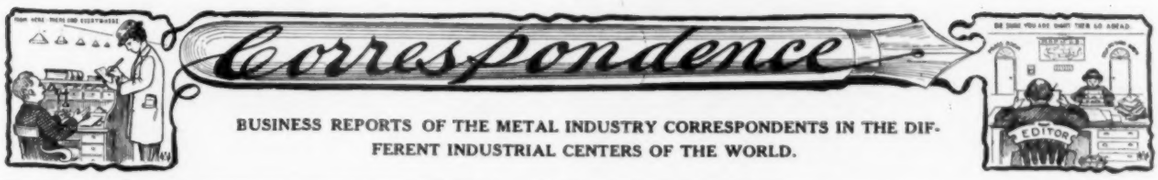
President, Charles H. Proctor, Arlington, N. J.; Treasurer, H. H. Reama, New York, N. Y.; Corresponding and Financial Secretary, Royal F. Clark; Recording Secretary, Edward Faint. All correspondence should be addressed to the Corresponding Secretary, Royal F. Clark, 246 Fulton avenue, Jersey City, N. J. This is an educational society, the objects of which are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets at Grand Opera House Building, 309 W. 23d St., on the fourth Friday of each month, 8 p. m.

Twenty members attended the December meeting of the association, held on the 22d. Three active members were elected. A communication from W. F. Barrows, of Toronto, stated that the prospects of forming a branch in that city were very good. Papers were read and talks given by C. H. Proctor on the "Electrochroma Process," A. J. Stremel on "Preparation of Lead Work for Electro-Deposition," C. O. Field on "Electro-Cleaners in Combination with Mineral Cleaner." General discussion followed, short talks being given by Hugh Baxter, R. H. Sliter, Elias Schor and W. H. Betz.

Walter C. Gold read a paper on "Carborundum," at the meeting of the Philadelphia branch, held December 29. An open meeting will be held February 21, 1912.

Secretary Faint in speaking of the association during 1911 says: "The past year has been one of hard work for this organization, meetings were held each month, and each one seemed to prove more interesting than the previous one—all were well attended. Our annual banquet was held in New York City, February 11, 1911, and resulted in bringing together the members and their friends. One public meeting was held in October, at which 16 applications for membership were received. Our present membership is 177.

"A number of papers have been read during the year and have been published in the quarterly bulletin. The outlook for 1912 is very bright—we will endeavor to do more than in the past—we are still striving to standardize solutions—we expect to establish a research laboratory, and issue a monthly bulletin giving full accounts of the work of the association and the papers read at our meetings. The next annual banquet will be held February 10, 1912."



BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

JANUARY 8, 1912.

It is with optimistic uncertainty that the new year has begun in the Naugatuck valley, as far as its metal industries are concerned. There are signs and prophets—and the pessimists are not the least prominent among the latter—but on the whole the feeling is good and the new year is not expected to prove any less prosperous than the past twelve months. If it meets this expectation nearly everyone will be pleased. Looking over the year 1911 one can see little, comparatively, to be dissatisfied with. Business was slow and hesitating all during the first six months, for most of the brass and copper goods' producers. The latter six months were entered hesitatingly and until the first of September there was little encouragement for the men in the ranks, who could not see what was ahead. From September until the Christmas vacation, however, there was little complaint heard, local conditions being considered collectively. If there was a weak spot in the year's record it was in the watch-making line. It was not a year of plenty and prosperity for the New England Watch Company. It saw the demise of the infant industry started by Archibald E. Bannatyne and backed by some of the ablest men, financially, in the Naugatuck valley. But the New England has succeeded in weathering the storm and is still doing business. The watch department of the Waterbury Clock Company, wherein is made the cheaper Ingersoll watches, goes merrily ahead and is grinding out the little timepieces that are encircling the globe at the rate of thousands daily. Christmas gifts of Ingersolls were doubtless made in many lands and their introduction to the juveniles is sure to bring further business after a few weeks have elapsed and the "innards" have been investigated. The second watch, however, will be used to keep time and thus the Waterbury watch keeps boosting its own game the world over.

Business still is dull in the watch line, that is, the business for higher priced watches, and the New England Company called in its salesmen before Christmas, preferring to pay their salaries at home to expenses on the road. The shop shut down a longer period than most of the other factories hereabouts, but it was not longer than in other years and the company's business probably showed a gain for 1911 over the business done in 1910.

All the companies turning out staple products, found enough business to keep their plants running, although for about six months of the year in many of them the minimum payrolls were in force. The novelty departments of the larger corporations and those companies whose business depends largely on the fads of the times found the year a comparatively dull one, although in places the going was swift, and orders came fast. Just now it is dull and the outlook is not bright for those same novelties, but, with other things equal, they are sure to enjoy their proportionate share of the general prosperity. For the new year the general outlook is good. Copper market conditions and prices are now beginning to be an important factor. It is predicted by some financial experts that copper will hereafter know no minimum lower than fifteen cents a pound during hard times, but fifteen cents is the highest "low" price in four years and if it is to stay there it may have some effect on the advance of brass and copper manufacturing towards a more prosperous condition than that of the past year. It is doubtful that there can be any certainty of the fifteen-cent copper prophecy coming true and the despatches of the past few days, one of which announces an increase of 2,500,000 pounds a month over the average for 1911, add to the uncertainty of its fulfillment.

With the copper prices near a moderate figure, there should be a good stride forward early in the year unless unforeseen political disturbances interfere. There is no indication of anything but a healthy general advance in industrial conditions and the railroads are helping its coming by filing orders for new rolling stock. Building for the past year was in excess of that for 1910, and while there is a great accumulation of hardware stocks, indicating a falling off in the retail trade, there is no likelihood, it is thought, that this condition will be prolonged. Machinery orders from the foreign fields are not falling off. Germany especially is doing a good business with the factories hereabouts and the Naugatuck valley manufacturers have always had a good patronage from English and Scotch corporations.

This indicates that there is no cessation anticipated in the revival which started abroad over a year ago, and if there is no new war declared business should go merrily forward. And yet a war may help. On the whole, 1911 may be written down as a good average year for most of the Naugatuck valley industries. In the same general view we may call the attitude towards 1912 hopeful, if hesitating, and when a Connecticut yankee is hopeful, even if a bit over-cautious, the condition is healthy and progress may be looked for. Being presidential year the speed may not get to the maximum for any extended period, if at all, but there is nothing now to indicate a poor outlook for most of the products of this part of the country.

The Baird Machine Company, of Oakville, Conn., has begun moving to Bridgeport, some of its machinery having gone there within the past month. Some of the officers and employees are on the Stratford site superintending the setting up of the plant and rapid headway is being made. It is doubtful if the headquarters of the company will finally change to Bridgeport much earlier than March 1, as they are still maintained here and only the heavier work departments will begin to operate in Stratford at once as it will be impossible to go on doing business during the interim required for moving if the entire plant were to be changed. Before spring, however, the company will doubtless be housed in its new home and well along the path of progress among the new neighbors of the Bridgeport manufacturers. Products of the company have been marked with the Bridgeport label for some time in anticipation of the changes.—F. B. F.

AMERICAN BRASS COMPANY

Perhaps the most important announcement here marking the close of the year was that of the change in the American Brass Company's organization. That company, until January 1, a holding company only, is now an operating company, and the various Naugatuck Valley corporations, operated under their own names, but subsidiary to the American Brass Company, now become factories of the American Brass Company. There is to be a vice-president at each point, and the business is to be done by the American Brass Company.

Waterbury will be its headquarters, and it will continue its office force here, probably enlarging it from time to time with additions from the executive offices of the subsidiary concerns. Already a site has been secured near the plant of the Waterbury Brass Company, and on it an office building will be erected later. There is no change in the personnel of the officers, but the offices will be known under slightly different names, the presidents of the various subsidiary concerns remaining as the executive heads of their mills, which now become branches of the parent company, but as officers of the American Brass Company. Thus the minor companies go out of existence and the new organization is now established. The final dissolution of the old corporations will probably take place at the annual meeting, which will be held the first Tuesday in February. As the American Brass Company is the only stockholder, this seems assured.

There are many economies to be put into effect with the combination of the various companies, which, however, will probably have little effect on the number of employees or the size of the payrolls, but which will save much expense on account of eliminating much unnecessary detail. Already the benefits of the plan as a labor and time saver are apparent,

for the trucking and freight handling is being systematized and greatly expedited. It will probably result also in greater satisfaction for the customers, as, with the orders going direct to the American Brass Company, they can be put out to those mills where the least detail will be likely to occur in their execution. The mills are now being operated as branches under the folowing names and executive officers: The Benedict & Burnham Branch, E. L. Frisbie, vice-president; Thomas B. Kent, vice-president; A. M. Dickinson, manager. The Waterbury Brass Branch, John P. Elton, treasurer; H. M. Steele, vice-president; G. C. Hill, manager. The Ansonia Brass & Copper Branch, R. A. Cowles, vice-president; W. A. Cowles, manager; C. A. Cowles, assistant manager. The Coe Brass Torrington Branch, George H. Turner, vice-president; E. J. Steele, manager; J. B. Thursfield, assistant manager. The Coe Brass Ansonia Branch, Charles F. Brooker, president; A. S. Brown, assistant manager.

The executive officers of the American Brass Company are: Charles F. Brooker, president; E. L. Frisbie, vice-president; A. A. Cowles, vice-president; Thomas B. Kent, vice-president; John P. Elton, treasurer; John A. Coe, Jr., assistant to the president; George E. Cole, assistant treasurer; Gordon W. Burnham, secretary; Franklin E. Weaver, assistant secretary. —F. B. F.

NEW BRITAIN, CONN.

JANUARY 8, 1912.

In taking up the business activities of the new year, the heads of New Britain's great manufacturing concerns engaged in the various branches of metal working, feel confident that they are entering upon an area of continued prosperity. The general opinion is that the presidential election will not interfere very greatly with trade conditions influencing New Britain, though there is some speculation as to what Congress may do, and in what way it will affect local conditions. The men in control of the local factories take a conservative yet hopeful view of business during the coming year. The following statements have been given out by various men holding high positions in the hardware world so far as New Britain is concerned. Landers, Frary & Clark have enjoyed a busy year during 1911, and the large addition being built to their enormous plant proves conclusively that their business is constantly increasing. President C. F. Smith, of this concern, says: "It looks as though business conditions in 1912 would be about the same as in 1911."

"In our opinion the coming year will be one of conservative buying on the part of the jobbers and retailers of the country, and the amount of goods the factory can sell will depend entirely upon actual consumption by the consumer. We are hopeful of having a fair business during 1912, but with presidential election to contend with, too much should not be expected."—Alix W. Stanley, of the Stanley Rule and Level Company.

H. C. Noble, president of North & Judd, takes a more pessimistic view of the situation than some. He says that his concern has had good business during the past year, and that the failures in crops in some parts of the country has had a bad effect upon trade. Mr. Noble also speaks of the hospitality of the Government towards large corporations, and the uncertainty of the country preceding a presidential election, and says, "Taking all things into account, we do not expect that the year 1912 will check up as a record-breaker in the way of good business, much as we would prefer to thing otherwise.—A. L. M.

MERIDEN CONN.

JANUARY 8, 1912.

The business in the Meriden factories has not been as good this fall as it has been for the past three years, but this I believe to be only apparently so. The volume of business for at least three years back exceeded all expectations, and many manufacturers found themselves unable to fill orders, owing to the fact that the fear of overstocking kept them from making a sufficiently large stock to meet the demands. This seems to be a common fault with silverware manufacturers. The designs changing so rapidly, it is necessary to design and manufacture almost entirely a new line throughout each year. One small manufacturer made the statement that he considered the goods remaining on his shelves after Christmas to be valuable only for the metal they contained. This year most of the silver factories made a large stock during the quiet months of winter and spring. Those who had the foresight and courage to do so reaped their reward this fall. One manager stated that his factory did the largest amount of business during the month of October they had done in many years. Only a few of the factories have been running overtime, except in some few departments, and to the uninformed business has seemed to be at best only fair.

The International Silver Company factories have been running the regulation fifty-nine hours per week, and a few have been running some of their departments overtime. Factory E, International Silver Company, recently completed a large order for the new Taft Hotel in New Haven. This order has kept several departments busy for many months. The Charles Parker Company factories have been running full time all the fall, and have been especially busy in their piano stool department. Business in the Bradley & Hubbard factory has been good, the demand for their lamps being greater this year than ever before. The Edward Miller Company have been busy throughout the year, and have been working overtime in many departments, business in the gas and electric portables being especially good.—F. O. V.

BRIDGEPORT, CONN.

JANUARY 8, 1912.

Whether or not there be any charm in the possession of all the major necessities that go to make up an ideal manufacturing community, Bridgeport's past year, just closing, has been unusually successful. By "ideal conditions" is assumed: First, unrivaled transportation facilities, by rail and water, both for incoming raw material and fuels, and outgoing finished product; second, close proximity to the steadiest and biggest markets for manufactured products, without the drawback of being within the zone of their artificial values set on labor and material; third, industrial stability, a spirit of the utmost good will as between the employer and employee; fourth, industrial efficiency, a supply of skilled artisians in every trade which has become established in this section. The year has witnessed a development in factory building in the interest of new industries which breaks the record even of the preceding year, which in turn was far in advance of the figures for any other year in the city's history. This is practically all new material, as the 1910 record year was due to a number of the largest factories increasing their plants all the way from twenty to one hundred per cent.

The local organization of manufacturers—the Manufacturers' Association—has reflected the success of its various members by a large increase in membership. Its value to its members and the community at large is greatly augmented through the establishment during the summer of a traffic department, to be in charge of Mr. Frederick A. Bennett as traffic manager. Mr. Bennett acts also as secretary of the association. As an instance of its worth as an influence in the community, it may be noted that in supplement of the suit of several affiliated associations of shippers against the express companies of the country, the local association, through its new traffic department, has instituted before the Interstate Commerce Commission an independent suit against the Adams Express Company, alleging a discrimination in express rates against the shippers of Bridgeport.

To promote the city's reputation as the industrial capital of the State, the Manufacturers' Association is persistently active in keeping at the highest state of efficiency the various factors which have been instrumental in bringing about this condition. These were itemized in the opening sentences of this review. In the last analysis, the most potent of these may be their success in maintaining, without friction or ill will—the element of industrial peace, which now so largely enters into a reputation for successful attainment in any manufacturing community. This has been accomplished by a disposition to promote absolute rankness in the discussion of labor differences and difficulties. For 1912, the outlook is plainly optimistic. Existing industries in many cases must immediately increase their manufacturing capacity. This continuous success and growth is so widely known in this section of the country that it is not surprising to learn of many prospective further additions to the total number of manufacturing plants. Some of these will be offshoots, of course, of existing factories already here. Their number usually about equals the acquisitions from without the city.—M. E. B. G.

PROVIDENCE, R. I.

JANUARY 8, 1912.

The year now closing has been, on the whole, a very satisfactory one for the metal industries of this city, and the outlook for the incoming year is very bright. The more important of the metal industries here are those comprising and allied to the manufacture of jewelry in gold, silver, plate and brass, employing—men, women and children—fully 15,000. This industry has experienced one of the most remarkable years in one respect in the century and a quarter since manufacturing jewelry became a recognized industry. This was in the lack of any "rush" or "boom" seasons. From the beginning to the close there has been a steady continual business, busier at times than at others to be sure, but none of the night rushes that have heretofore been a part of the year's business. Several things that enter into this change, which is hailed with satisfaction by both employer and employee, are the law forbidding the employment of women and children more than 58 hours a week, the purchasing by the jobbers of small orders as they needed the goods and the endeavor to establish fixed dates for the showing of new goods. The manufacturers welcomed this steadiness, as it made a saving on heat and gas bills, and the employees welcomed it because it furnished them steady employment in place of the old time custom of about four months of 14-hour days, four months of half time and four months of no work. It is believed that this change has come to stay. The effort that was made by the Wholesale Jewelers' Association and the National Manufacturing Jewelers' Association to establish fixed dates for the showing of new goods did not prove successful, and a short time ago the rule was repudiated, but, nevertheless, there are a great many who believe that it would be better for everybody concerned if it could become operative and strictly adhered to.

The custom that has prevailed for the past two or three years on the part of the jobbers to send in their orders to the manufacturers for exactly the number of articles needed for filling orders and thus make the manufacturer carry the entire stock, has grown to a larger extent than ever the past year. This has resulted in the manufacturer having to carry the entire load of manufactured stock from which to fill orders at a moment's notice and then carry the book account for an indefinite period. In the latter connection rests the most discouraging feature of the past year's business in that there has been a constant string of failures, bankruptcy proceedings, extensions and other financial difficulties that in the aggregate have amounted to a considerable total and, generally speaking, it is the manufacturer who gets the short end. The retailers and jobbers have had their living, and usually a good one at that, and the manufacturer has waited. There are some who seem to think that the next few months are to be thickly strewn with these wrecks. The unusually large invasion of buyers to this city the early part of December was the largest ever seen here, and at its height nearly 75 jobbing concerns were represented in the field. It is reported that few placed any very heavy orders with any single concerns, but the aggregate is believed to have been large. At any rate, the manufacturers were much encouraged at the outlook. It is believed that notwithstanding it is "Presidential" year, the year 1912 will prove to be a satisfactory one all round.—W. H. M.

ATTLEBORO, MASS.

JANUARY 8, 1912.

The year of 1911 seems in retrospective not to have been unkind to the manufacturing jewelers of Attleboro, North Attleboro and Mansfield. There is a tendency always to lament the departure of the 1907 boom, and to compare present business with that high-water mark, but on the whole the past twelve months appear to be as good as if not a little better than the average. Several new firms were started, a number of firms increased their quarters, the number of employes seems to have been quite as large as ever, the falling off in orders in some lines were equalled by the extra business other lines enjoyed, and the year's record is not such a bad one, especially when it is considered in the light of a spring trade that now seems very promising. The holiday season is the big test for the jewelers, and despite the doleful cries that went up when the summer drought hurt the crops, the Middle West and Southwest did not seem much affected when the time came to prepare for Christmas. There were not so many rush orders, it is true, but this kind of work eats up profits because it costs more, and the same volume of business more evenly distributed pays more. Business after the holiday trade was past was better than was expected, though it was naturally a little dull. The spring opening was full of promise and the jewelry buyers who invaded Providence were never so numerous. There is some hesitancy about picking the leading lines for next year, but on staple goods the orders are reported very fair. The salesmen went out earlier than usual, and their earliest reports are satisfactory. Briefly stated, the principal events in the business history of 1911 in this district follow:

Knight cotton mills twice boost prices and start January 1, 1912, on full time. Holbrook Manufacturing Company buys J. E. Blake mesh line. New cotton mill built in southern part of town. Attleboro Trust Company organized. Thirty thousand feet more floor space added to Watson and Newell. Census shows Attleboro's manufacturing product grows 51 per cent. in five years. L. A. Busiere becomes part owner in Bell Finding Company. W. L. King and E. D. Gilmore offer town Holden street site for factory. F. W. Weaver succeeded the late Major Horton as Attleboro Savings and Loan president. Ten-cent cut in gas rate announced. W. H. Saart Company buys Forest street factory. H. F. Barrows Company sixty years old. Advance Button Company, of Providence, incorporates.

The Bugbee-Niles Company, a solid gold firm, is to remove from North Attleboro to Providence in February, and the principal reason given for the firm's decision is dissatisfaction over taxation. The firm's valuation was increased $2,000 this year by the assessors, and a $2,000 personal tax was levied on Alpin Chisholm, head of the company. In addition to this, it is pointed out that as a Rhode Island corporation, Bugbee-Niles is subject to a corporation tax there as well as in Massachusetts, in addition to taxation on each stockholder for the value of his stock. Following the announcement of Bugbee-Niles came rumors that other North Attleboro firms were preparing to take similar steps.—C. W. D.

NEWARK, N. J.

JANUARY 8, 1912.

The past year of 1911 has not been quite up to the best years of the past, but it has not been the worst either. It has been slow at times, and conditions have been dragging somewhat. This is due to the necessity for the people to economize in every direction in order to live, and, of course, luxuries, such as jewelry, silverware and metal goods, have a decreased demand. However, these lines, so far as we can see, are not any slower than many other lines, such as the iron and steel trades, lumber business, railroads, clothing, textile, baking, silks, pottery and other trades too numerous to mention. The various firms have had a very good demand for the holiday goods, and the factories have been quite busy during the last three months. The West and the South have bought more liberally than the East. The prospects for the coming year of 1912 are fairly bright, although it is too early to cast trade conditions, but we do not look for a heavy year; it is more likely to be the same as during the past year. Many improvements, however, are to be made to factories, some new factories are being completed for the use of these trades, and a number of new firms are starting business.

Thomas A. Edison, of Orange, N. J., opened the electric show at the Grand Central Palace, which was held recently in New York City, and the producers and consumers of copper gave him as a memento a solid cubic foot of copper. It weighed 486 pounds, and it is said that Mr. Edison does not intend using this as a watch charm. It was mounted on an ebony pedestal.

The Newark Museum Association of the Public Library have here on exhibition a very fine collection of bronzes, pottery, porcelain, medals, lacquers, ivories, gold, silver and metal work.

William Mockridge fitted up a jewelry making shop at 46 Oliver street, but has not fully developed his plans as yet.

The vacuum cleaner is being used among the manufacturing jewelry and silver shops in taking up all the dust and dirt from the corners, cracks, and between the boards on the floors and walls. A considerable saving is reported through the use of this device. Even where a refiner comes and cleans out a shop once a year to refine the sweeps, one firm reports getting a thousand dollars' worth of gold out of the dust and dirt after the refiner got through. The American Oil Supply Company have given up their Chicago and Providence offices, and all salesmen will start out from Newark and make it their headquarters.

The J. E. Mergott Company, who make brass and bronze mesh bag supplies, have enlarged their factory by erecting a new building, four stories in height, 26 x 50 feet in size, and cost $70,000. This building now is 375 feet long, and their trade has been extending each year. Oscar Windorff, who had charge of the repair department of Cross & Beguelin, 23 Maiden Lane, New York City, is now with the Eastwood-Park Company, of Newark, who make silver and German silver toilet sets and novelties. James R. O'Donnell opened a shop at 8 Governor street, to do enameling and engine turning.

S. Komeya, a Japanese of Honolulu, Hawaiian Islands, has taken up the deposition of metals with Morehouse & Dalton, of Mechanic street, and will go back to his home and start in this line on Queen street. He has been under the special instruction of James N. Morehouse for six weeks. He will put in a plating plant. He used to be in the bicycle business, and has also taken a course in vulcanizing at Akron, Ohio. Robert Gilchrist & Company, of Third and Trumbull streets, Elizabeth, N. J., importers and manufacturers of ground ferro-manganese, ferro-silicon, manganese dioxide and carbon, are now moving their plant into a new building on the water front. They will now have good siding facilities. They are increasing their capacity three times what it formerly was, have put in new machinery, and their business is growing larger month after month.—H. S.

PHILADELPHIA, PA.

JANUARY 8, 1912.

Business here among the foundries, metal workers, etc., has been fairly good for the year of 1911. The manufacturing jewelry and silver goods trades have not been up to the high-water mark, but during the past three months has been more active. The cheaper grades of goods have had a very good sale, while the high grade lines have had a falling off, but on the whole business has not been altogether disappointing. One of the surprises here was the petition in bankruptcy against Simons Bros. & Company, one of the oldest manufacturing jewelry houses in the country, one of the most prominent in the trade and which enjoyed the best of financial standing. The jewelry end of their business has been turned over to Hoover & Smith, but they continued to make silverware, thimbles, novelties, gold chains, umbrellas, presentation swords, etc. It is supposed that they are solvent today. The concern owes $265,000, of which $200,000 is to bond and trust companies, $15,000 for bullion, and $30,000 to the jewelry trade. The firm is incorporated for $300,000, and is supposed to have ample assets. They have been in business over seventy-six years. The factory is at 611 Sansom street and 618 Chestnut street, with offices in New York, at 15 Maiden Lane and 320 Fifth avenue. F. M. Simons is president; Edward S. Simons, vice-president, and Duffield Ashmead, secretary and treasurer.—H. S.

ROME, N. Y.

JANUARY 8, 1912.

The manufacturers of Rome, N. Y., will hold no sad memories to associate with the year of 1911. It has been a year of progress for these men, who have made Rome one of the greatest manufacturing cities in the Empire State. It saw no slacking of the steady growth in the amount of manufactured goods shipped from Rome freight houses, in the payroll of the working men, or the prosperity of the several companies.

As told in a special article printed in THE METAL INDUSTRY last July, the manufacture of brass and copper is the leading industry of Rome. And business has certainly flourished with the Rome Brass and Copper Company.

This concern makes the brass and copper sheets and tubes for consumption in factories which produce finished goods for household use, such as bedsteads, copper teakettles, wash boilers, tea and coffee pots, etc. During the past year the capitalization of the Brass and Copper Company has been raised from $40,000 to $2,000,000. Up to the year of 1911 this company was unique among manufacturing concerns in this particular of its small capitalization. It was known that this amount would cover the cost of but a small amount of its equipment. The capable management of Jonathan S. Haselton made possible this industry's wonderful growth in size from a small rolling mill to the two great plants which made up the Rome Brass and Copper Company in January, 1911, while all the time generous dividends were being paid on this amount of stock. Besides that, Mr. Haselton's energy was largely instrumental in the building up of the Rome Metal Company, the Rome Tube Company, and the Rome Manufacturing Company, which, with the Rome Metallic Bedstead Company, form the city's greatest manufactories.

During the past year the Tube Company and the Metal Company have been absorbed by the Brass and Copper Company, of which the late Mr. Haselton's son, Mr. Barton S. Haselton, is manager. As the year closes, the company puts in operation the great new plant for the manufacture of seamless brass and copper tubes. The plant is located on a plot of several hundred acres in the eastern part of the city, where the metal plant is also located. A part of the old plant of the Tube Company will be moved to the new plant for use there, and it is probable that the rest of the building, which is located near the New York Central Railroad, will be sold or rented. All the brass and copper plants are working to capacity, and are even having more work than can be done. This condition is expected to last throughout the year of 1912. The copper wire industry is not so busy at this season.

A story has been circulated recently in Rome that the plant of the American Locomotive Company, now located at Schenectady, was to be moved to Rome. A prominent Rome manufacturer said this would be very unlikely, as Rome could not furnish enough homes, etc., for the workmen of a plant of that size.—J. K.

BUFFALO, N. Y.

JANUARY 8, 1912.

Measuring this year's business by clearing house reports, Buffalo is forging ahead in all lines of business, and the outlook for 1912 for all interests allied with the metal trades is excellent. The year 1911 closes with a normal record of business activity. It is predicted by the prominent firms in the allied metal industries that 1912 will close far ahead of the present activity. Many important industries have been established in Buffalo the past year, and 1912 will record their rapid development in their special lines. Among these industries are the Vulcan Electric Heating Company, which will make all sorts of electrical appliances for household use, and the Tiffany Electric Manufacturing Company, makers of the famous Tiffany electric clocks. Both of these concerns are turning out their products from the Ericsson plant. The Vulcan Electric Company came here from Chicago and the Tiffany Company from New York. Canada has sent to Buffalo the Positive Clutch and Pulley Company, and the Philadelphia Quartz Company brings a $100,000 plant to Indian Church Road. The National Core Oil Company is another new industry which completes a most unusual number of industrial plants for one city to record that are allied with metal interests. Advance in the automobile industry was positively shown in the automobile show the closing week of the year. The Pierce-Arrow plant alone uses 466,686 pieces of stampings, 367,618 forgings, and a million and a quarter pounds of castings in a year. New firms are increasing the output of castings and stampings, and not only factories but repair shops report an active trade surpassing that of 1910, and promising an even better future for 1912. Buffalo's aluminum business was good and closed the year with heavier orders than it opened. What the aluminum interests are doing and how they are progressing was well demonstrated during Buffalo's Industrial Week at Machinery Hall, where

large exhibits were in charge of W. H. Mosher. The display showed the many uses to which metal castings are applied and the increasing demand for aluminum ware. Plumbers look forward to a big year for increased business in 1912, and there is every evidence that their fondest hopes will be fully realized. Building records in Buffalo have never in its history reached the boom which they are now enjoying. For instance, in one single day plans for new buildings filed totaled $700,000.

The Republic Metalware Company, C. H. Barton of the Buffalo Metal Furniture Company, the George A. Ray Manufacturing Company, the Hard Manufacturing Company, the Lumen Bearing Company, the Cataract Refining and Manufacturing Company predict increasing business for 1912, and declare that while the business of 1911 was only normal it was far better than in 1910, and the outlook for 1912 is most encouraging. There is an increasing demand for art metal products. Buffalo is being recognized for its home industries in this line, and the trophies and cups of Buffalo design and make have been in popular demand, making a good foundation for an increasing business in the coming year. The increasing demands of new business have forced the erection of a $25,000 foundry for the American Radiator Company; the Republic Metalware Company is to build a $38,000 warehouse; the Buffalo Steam Pump Works is to build a $35,000 addition, all of which are best indicators of how business conditions are at the closing of 1911.—S. E. B.

CLEVELAND, OHIO

JANUARY 8, 1912.

The year 1911 in Cleveland has been one of unusual interest to those men engaged in the metal industries. While it will probably not be a banner year in some respects, it was entirely satisfactory in many. Business conditions in Cleveland are reported to have been much better than those in many other cities throughout the country. This has been due largely to the fact that Cleveland industries are so diversified that business depressions are seldom felt here.

The year has seen a steady increase in the volume of business transacted by most of the metal concerns in this city. The growth of the automobile industry has helped materially to increase business, for not only have many of the brass and aluminum companies been making large quantities of supplies for Cleveland concerns, but they have also been shipping very large quantities to Detroit and other large automobile centers. A distinct innovation in the automobile business in Cleveland has been the growth of the motor wagon business. Most of the factories here which had not previously done so, have begun the manufacture of commercial vehicles. The belief is widespread that this will give more stability to business and thereby make it more profitable to all concerned.

The business of manufacturing plumbing supplies has grown steadily in this city. The last year has seen a large volume of business done in this line. The amount of building during the past year has been unusually heavy, not only in this city but throughout the entire country, and the Cleveland manufacturers have benefited thereby.

The aluminum business has been given an impetus through its increased use in automobiles and flying machines. Automobile factories from all over the country have been throwing business in Cleveland's direction. Many experimentors on aerial craft have also been directing business this way.

Reports from the various brass foundries in Cleveland indicate that their managers report that the volume of business has been entirely satisfactory. There has been no phenomenal growth. The increase, however, has been sufficient to keep every one contented. The hope is expressed that during the coming year a steady volume of business will be maintained.

The coming year in Cleveland looks unusually good for the metal industry. There is every indication that there will be no slacking up in the various lines in which Cleveland excels. It seems probable that the brass workers will seek a readjustment of their wage scale during the year, but it is believed that this will not affect the situation seriously.

One of the interesting corporations of the past month was that of the Metal Body, Tank and Fender Company, of Cleveland, with a capital of $10,000. The incorporators of the new concern are C. C. Meyer, A. J. Peet, C. J. Robinson, B. A. Perkins and E. J. Hartman.—McM.

DETROIT, MICH.

JANUARY 8, 1912.

Every brass and aluminum manufacturing establishment in Detroit has experienced an unusually successful year, when taken as a whole. It is true that dull times have been experienced for short periods and some of the nerveless manufacturers have made some disparaging statements, but as they look over conditions hardly a firm has anything but encouraging expressions for what they did in the last twelve months. The manufacturers of plumbers' supplies in particular feel good over what they have accomplished and so encouraged are they that predictions for greater things are being made for 1912. Large firms like the Pemberthy Injector Company have been operating continuously without a thought of laying off men. This great plant is making enlargements and improvements in various ways, which shows that business in its line is good and continues to improve. The Detroit Copper & Brass Rolling mills have experienced an unusually successful year, and will do a greater business during 1912 than at any time in its history. The same is true of the Michigan Copper & Brass Company. In fact, all the large concerns of the city have had about all they could care for during the last twelve months, even though at times there seemed to be a lull in the usual run of business.

Detroit's rapid growth and the vast amount of building during the year has made a good market for various kinds of brass supplies. Thousands of dwellings and innumerable factory plants have been erected and many others enlarged during the year. This work, of course, has aided greatly in stimulating the demand for plumbers' supplies in Detroit. While perhaps other cities have not progressed so rapidly along this line, their growth also has been steady, and as a result the brass and aluminum manufacturing business has kept up its end with other establishments. Although the manufacturing world looks upon Detroit as the greatest of automobile centers, it seems to forget that the City of the Straits also leads in the production of brass and aluminum products. When conditions are favorable in Detroit in this line it usually is safe to believe that other cities which manufacture brass and aluminum have no cause for complaint. W. P. Putman, of the Detroit testing laboratory, in reviewing the year just closed, declares that business among the brass and aluminum manufacturers has been the best in some years, with prospects of a large increase during 1912. "I do not hesitate in saying that conditions throughout the year have not been equaled for a decade," declared Mr. Putman. "The outlook is great and manufacturers in Detroit expect much in 1912. Of course, there was a slowing down during the last few months, but the outlook for 1912 is the best that has greeted Detroit in many a day." John J. Whirl, secretary of the Employers' Association, an organization composed of a large number of brass and aluminum manufacturers in this city, also is highly pleased with the prospects for next year. "I base my statements on the steady demand for employes, that have come to this office," Mr. Whirl says: "While times were not so brisk in the past three months, there has been recently an unusually steady call for ordinarily skilled machanics and laborers from the many brass and aluminum institutions throughout the city. I expect manufacturers in these lines to experience great prosperity in 1912."

The outlook in the automobile industry during the next year is the brightest in the history of the business. This, of course, means much for brass and aluminum manufacturers. A new field is gradually opening up, and the coming year will see a great boom in the automobile business. Reference here is made to the manufacture of commercial trucks and delivery wagons. This field has already been touched in the past. Manufacturers are just jumping into it. No one but the brass concerns realize what this means. It will require strenuous work on their part to keep pace with the demand for accessories and parts that will be needed when the factories are running heavy on these machines. The business outlook in Detroit at the opening of the year was never so good in the history of the city. The place is growing so rapidly that a population of 1,000,000 is predicted before the next census is taken.—F. J. H.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK

ADDITIONAL TRADE NEWS WILL BE FOUND UNDER "CORRESPONDENCE."

The Hamilton Brass Company, Hamilton, Ontario, will shortly move into larger quarters, the property which they occupy at present on James street having been sold.

The Hamilton Company, 50 Church street, New York, announce that they are equipped and prepared to promptly execute any and all orders for lead burning in all its branches.

Wm. H. Bloom, manager of the New Kensington (Pa.) plant of the Aluminum Castings Company, reports that they have installed a machine shop which is equipped with all the modern devices.

J. A. Vail, general manager of the Fairbanks-Morse Company, Beloit, Wis., reports that their new brass foundry has been completed, and they are now occupying the building, which is 50 by 150 feet.

The Blake Specialty Company, Inc., manufacturers of floor drains, waste fittings, sewer traps, test plugs, etc., Rock Island, Ill., announce through J. J. Croft, that they are about to install a galvanizing plant.

The Kerr Turbine Company, Wellsville, N. Y., announce the appointment of the following new agents: St. Louis, Walter L. Flower, 312 South Eighth street, and New Orleans, C. E. Grevemberg, 1023 Maison Blanche Building.

The Waterbury Metal Products Company, manufacturers of metal novelties, tool makers and job platers, Waterbury, Conn., have established a factory for the manufacture of small metal goods, such as are turned, cut and drawn and stamped.

The Globe Machine & Stamping Company, manufacturers of tumbling barrels, dies, stampings, sherardizers, Cleveland, Ohio, are erecting a new factory building on West 76th street, which they expect to complete about the end of May.

The American Brass Company, Waterbury, Conn., state that the recently published report that they were fitting up a building in which the manufacture of brass and copper bottles would be carried on, is absolutely without foundation.

The Pittsburgh Lamp, Brass and Glass Company, Pittsburgh, Pa., is again in good financial condition, and on December 29 Court No. 1 discharged the receiver, Frank G. Wallace, and ordered him to turn the concern over to the officers of the company.

The Lancaster Foundry Company, manufacturers of castings, Lancaster, Pa., announce through James R. Haldeman, general manager, that they have recently installed a nickel-plating plant and contemplate adding several special lines to their present products.

The Electro-Chemical Works of Kempen-Rhein, Germany, who are working one of the largest detinning plants in Europe, has been converted into a limited company under the name of Electrochemische Fabrik Kempen-Rhein, Dr. Brandenburg & Weyland.

William H. Craig reports that the transfer of the property of the Bucyrus Foundry to the Craig Foundry has been accomplished to the satisfaction of all parties concerned, and that they contemplate building an electroplating department for their registers.

C. J. Rath, formerly president and general manager of The Alliance Brass & Bronze Company, has completed and equipped a modern brass foundry, which will be known as the Marion Brass & Bronze Foundry, Marion, Ohio. The plant will have a capacity of fifty tons of brass per month.

The M. L. Brandt Cutlery Company, 84 West Broadway, New York, have recently equipped a factory, occupying several lofts at 42 Hudson street, for the stamping and nickel plating of an automatic razor stropper which they are now manufacturing. From twelve to fifteen men will be employed in the new factory.

Morris F. Clark, of the Clark Novelty Company, Rochester, N. Y., reports that he has purchased a block of land on Railroad street, containing a three story brick building and some vacant land. The novelty company will be moved into the building and a brass foundry will be erected on the adjoining land.

Bids are being invited for the half-million dollar expenditure for furnishings and fixtures for the New Filene department store. The bids include furniture for laundry, kitchens, soda fountains, dining rooms, carpets, rugs, shades, lockers, general store fixtures, etc. Address Wm. Filene's Sons Company, Boston, Mass.

The International Nickel Company, New York, has declared a quarterly dividend of 5 per cent. on the common stock, placing it on a 20 per cent, annual basis. The regular quarterly dividend of 1½ per cent. on the preferred stock was also declared. The common dividend is payable March 1, and the preferred February 1.

The National Conduit & Cable Company, 41 Park row, New York, announce that they have added a large brass foundry to their various departments. This foundry, which will be under special laboratory supervision, is prepared to make castings of brass and bronze alloys. Prices will be quoted on receipt of specifications.

The Griffith Manufacturing & Supply Company has been incorporated for the manufacture of brass, bronze, aluminum and gray iron castings, at Griffith, Ind., to succeed the B. B. Potter Foundry Company. The directors of the company are B. B. Potter, W. J. McFarland, Alexander Jamieson, J. W. Hough and Joseph Grimmer.

On petition of certain creditors, C. B. White has been appointed receiver for Paul S. Reeves & Son, manufacturers of brass and bronze castings, Philadelphia, Pa. The receiver has been authorized to conduct the business for 60 days, after which a report of the affairs of the concern will be made to Judge Holland, of the United States District Court.

The Standard Silver Company, Ltd., manufacturers of electroplated ware, Toronto, Ontario, announce that they are equipping a new plant for brass and copper spun goods, galvano plastics and the manufacture of special composition for insulators, for their own consumption. The factory will be of fireproof construction and entirely modern in equipment.

The Palmetto Metal Company, manufacturers of the well known "Palmetto" brand of railroad and mill babbitts, Chicago, Illinois, have recently been reorganized, which has brought to the concern largely increased manufacturing facilities, together with a large amount of working capital. The reorganized company is now in a position to extend its operations.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m., January 30, 1912, and publicly opened immediately thereafter, to furnish at the navy yard, Mare Island, Cal., a quantity of naval supplies, as follows: Sch. 4218, bronze hinges, hardware, brass machine nuts, brass cotter pins, copper wire. Sch. 4221, brass cocks. At the Navy Yard, Puget Sound, Wash., Sch.; 4221, brass pipe.

A. E. Flavell, of New Britain, announces that he no longer represents T. W. Coslett, of Birmingham, England, as agent for the rust-proofing process known as "Coslettizing." Mr. Flavell states that he is now engaged in perfecting another process or rust-proofing, which he expects to place on the market in the near future under the name of "Flavellite."

The Wolverine Brass Works, Grand Rapids, Mich., have exercised an option secured some time ago on a piece of property 300 by 220 feet, and are having plans drawn for a five story building which will just about double their capacity. W. C. Cornelius, secretary and treasurer, reports that the company has sufficient business in sight to practically fill the new plant as soon as they can complete it.

At the annual exhibition of the Society of Craftsmen, held December 6-28, 1911, at the Art Club Studios, 119 E. 19th street, New York, there was shown a fine arrangement of jewelry and art metal work. It would be worth while for all manufacturers in art metal work and jewelry to attend these exhibitions and note the progress made in the exclusive designs which originate at the National Society of Craftsmen.

The Abrasive Material Company, Philadelphia, Pa., manufacturers of "abrasive" grinding wheels, report through L. T. Byers, general manager, that they have recently awarded the contract for the erection of their new grinding wheel plant at James and Fraley streets, Bridesburg, Philadelphia. The buildings will be completed by July 1, and will cover somewhat over one acre. The power plant will be considered shortly.

President George D. Jenison, of the Decatur Gun Metal Finish Company, Decatur, Ill., reports a heavy demand for their new chemical product for use on automobile radiators and trimmings, which produces a glossy black finish and resists heat. They have made large shipments during the past month not only within the United States, but also to Canada and Honolulu. The company expects to move into larger quarters in the near future.

Some METAL INDUSTRY advertisers noted among the exhibitors at the automobile show just closed at Madison Square Garden were the following: Wm. Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa.; Joseph Dixon Crucible Company, Jersey City, N. J.; the Globe Machine & Stamping Company, Cleveland, Ohio; Janney, Steinmetz & Company, Philadelphia, Pa.; Light Manufacturing Company, Pottstown, Pa.; Merchant & Evans Company, Philadelphia, Pa.

The firm of John Hassall, Inc., manufacturers of rivets, escutcheon pins and special wire, Clay and Oakland streets, Brooklyn, N. Y., which was established in 1850, report that their business has been steadily increasing for the past ten years, and they are now making an addition to their plant on a plot which they recently purchased, 75 by 100 feet. The company report through W. Smith, secretary, that the outlook for the new year is promising, and indications are that prices for all lines will be higher.

In the December number THE METAL INDUSTRY mentioned Bulletin Number 119, issued by the Hanson & Van Winkle Company, manufacturers of platers' supplies, Newark, N. J. This bulletin relates to lacquers and the item referred to above gave the names of various kinds of lacquers as being handled by the Hanson & Van Winkle Company. The item should have read that all lacquers sold by this company are manufactured by them and not handled by them as dealers.

Henry Bender, who for many years had entire supervision and control of the factory of the Croselmire & Ackor Company, refiners of platinum, gold and silver, Newark, N. J., has severed his connection with this company and has started in the same line of business for himself at 42 Walnut street, Newark. Mr. Bender reports that he has every facility for supplying the trade with platinum and platinum-iridium material in any required form, as well as refining platinum, gold and silver scraps.

It is announced at Bristol, Conn., that hereafter the Bristol Brass Company and the American Silver Company will operate under separate managements. Julian R. Holley will be secretary and treasurer of the Bristol Brass Company only, while Samuel B. Harper will be secretary and assistant treasurer of the American Silver Company. President Albert F. Rockwell, of the New Departure Manufacturing Company, has been elected president of both companies, while Pierce N. Welch has been made vice-president of the brass company and Dean Welch vice-president of the silver company.

The Niagara Alkali Company, Niagara Falls, N. Y., announce that there has been a heavy drop in the caustic potash market and they have accordingly revised their prices and offer exceptionally low rates to the consumers. They will now sell caustic potash for less money than it has ever before been sold in the United States. On another page they make further announcement of their product and of the efforts in Germany to sell only German products. The Niagara Company, therefore, believes that American potash should be sold and consumed in America.

The government has decided to transfer the refining department from the Philadelphia Mint to the Assay Office, in New York. The new plant will be fully equipped and modern in every detail, and will probably be turning out fine metal before the first of February. The local deposits received at the Philadelphia Mint were small, and as the unparted metal had been reduced to a low balance, it was decided as a matter of economy to do no more refining at that institution. Philadelphia, however, is to be the main coinage institution of the country, and they expect to be busy at all times on minor coins and some silver. During the time the Philadelphia refinery was working in the past they refined some 250,000 standard ounces of gold and more than that amount of silver monthly.

Since November 1, 1911, Harry D. Harvey has been the sole owner of the Monarch Engineering and Mfg. Company, manufacturers of the "Steele-Harvey" crucible metal melting and refining furnace, Baltimore, Md., having bought out the interest of David R. Steele. Mr. Harvey states that it is his purpose to expand the business and gradually strengthen and broaden in all lines of furnace construction, melting from crucible furnaces, furnaces without crucibles, scrap melting, forging, rivet, bolt, welding, annealing, etc., and that he will gather about him a staff of competent practical men both from a work standpoint as well as those who go on the road to sell and install. The plant of the Monarch company covers a plot 550 by 220 feet, has a full shop equipment and a railroad connection.

The R. L. Hight Manufacturing Company, Decatur, Ill., who recently increased their capital stock to $40,000, have just finished moving into their new quarters at 222 East Main street. The company will use the first floor of the building as a machine shop, the second floor as the polishing and plating departments, and the third floor for experimental and testing. All the machinery will be electrically driven. Some of this is now in position, and it is expected that the entire plant will be running shortly. The chief business of the concern will be to manufacture the Hight electric clock, including automobile clocks and speedometers. Various kinds of jobbing work will also be done and orders are now on hand for several thousand sash locks and transom adjusters. President Hight states that the business outlook for his company for the present year is very promising.

The Williamsville Buff Manufacturing Company, Danielson, Conn., manufacturers of high grade cotton Buffs, have started operation in their new factory in that place, having removed from Williamsville, where they have been making Buffs for the past fifteen years. The product of this concern is known throughout the country as being uniform in quality at all times, its Buffs being made from first quality shirtings woven especially for the purpose and made in a workmanship manner. Several grades are made for various classes of work, the well known "A. 1" being the best. The registered trade mark is stamped on every Buff. The officers of the company, all of whom have been identified with this business

since the manufacture of Buffs was begun, are C. W. Atwood, president and treasurer; H. C. Atwood, vice-president and assistant treasurer; H. B. Atwood, secretary.

Recent changes in the organization of The Lumen Bearing Company, brass founders, Buffalo and Toronto, are as follows: H. P. Parrock, formerly Western representative, has been appointed sales manager, succeeding Allen Kendall, resigned; H. F. Russell, formerly purchasing agent, has been appointed sales representative covering central and western New York and eastern Pennsylvania; Albert Lockwood succeeds him in the office of purchasing agent; Louis S. Jones, for many years with the Prentiss Tool & Supply Company, New York, has been appointed sales representative in New England; H. O. Schwaner has been appointed sales representative in the Pittsburgh district; and Fred Ganderton, formerly with the Aluminum Castings Company, of Detroit, has been appointed sales manager of the Toronto plant, as assistant to N. K. B. Patch, the manager of that plant. The rapid growth of the company's business made it necessary to materially enlarge the organization both in its selling and operating forces, and recent additions and improvements have been made in both the Buffalo and Toronto plants.

CANADIAN HANSON & VAN WINKLE CO.

Additional advices regarding the plant of the Canadian Hanson & Van Winkle Company, Limited, which, as noted in the December issue, has been organized at Toronto, Ontario, are to the effect that the company has purchased a plot of land on the Grand Trunk Railway, and are erecting a factory at a cost of $50,000, where they will manufacture dynamos, plating apparatus, anodes of all kinds, in fact a full line of plater's and polisher's supplies. In addition to this a mill for manufacturing foundry facings is being installed and a complete line of mill and foundry supplies will be carried. Furnaces for brass foundry, cupolas and all other equipment for brass and iron foundries will be furnished. The new building will be completed early next summer, and in the meantime the Canadian business is being handled from the company's warehouse in Toronto. As stated in the December number, the new corporation has taken over the Rupert G. Bruce Company, Limited, Toronto, and Rupert G. Bruce has been made general manager of the new concern. Their offices are at 114-116 Jarvis street, Toronto, Ontario.

NEW ALUMINUM PLANTS

Three years ago the New Jersey Aluminum Company, Newark, N. J.; the Manitowoc Aluminum Novelty Company, Manitowoc, Wis., and the Aluminum Manufacturing Company, of Two Rivers, Wis., consolidated to form the Aluminum Goods Manufacturing Company. All three plants were kept in operation, and all have done a successful business along the lines the individual owners had established. The two Western plants having doubled their output in three years, it became necessary to build a large plant at Manitowoc to take care of this increased business.

The new plant is a strictly modern building, of cement, brick, and steel. The building is 43 x 300 ft., three stories high, with cement floors, steel beams, steel window frames and sash, fully sprinkled. The power is furnished by one cross compound, 400 h. p. Corliss engine, built by the Filter Manufacturing Company, of Milwaukee, driving a generator, which, in turn, furnishes the current to drive by electric motors all shafting in the entire shop.

The power house housing this engine and boilers is 50 x 130 ft., strictly fireproof. The boilers are of the water tube type of 400 h. p.; to provide for future growth, there is room enough to put in, if necessary, an additional power plant of the same size. The new plant was put in operation in January, 1912. A lot of new and automatic machinery has been bought, and is being installed, which is to enable the company to make large quantities of novelties at the least possible cost, and which machinery will enable the corporation to meet all competition.

The Aluminum Goods Manufacturing Company, Manitowoc, Wis., now enters its fourth year. The officers of the company are: George Vits, of Manitowoc, president; Joseph Koenig, of Two Rivers, Wis., vice-president, and J. F. Magee, of Two Rivers, secretary and treasurer. The selling department is in charge of George Vits, who is also general sales manager, while Joseph Koenig looks after the factory end of the now large business, as the general superintendent. The local managers of the respective plants are: G. A. Magee, in the Two Rivers plant, Hugo Vits in the Manitowoc plant, and Remus Koenig in the Newark, N. J., plant. Julius Kruttschnitt was the former manager of the Newark plant before he sold out his interests to the new company.

The Standard Aluminum Company, an independent concern, has also built recently a two-story factory 40 x 230 ft., at Manitowoc, Wis.

FOREIGN TRADE OPPORTUNITIES

No. 7804. Aluminum Goods and Lead Pencils.—An American consul in Mexico reports that a firm in his district desires to buy a line of aluminum goods and is anxious to secure from American manufacturers of these articles catalogues, price lists, etc. The same firm also desires to purchase a line of lead pencils, etc.

No. 7793. Die-Casting and Aluminum-Casting Machines.—A report from an American consul in the United Kingdom states that a resident of his district is anxious to ascertain the names of American manufacturers of die-casting machines, as well as of manufacturers of aluminum-casting machines, i. e., machines for manufacturing aluminum castings by a method of compression.

No. 7,648. Metal-working Machinery and Hardware Novelties.—An American consular officer in a European country reports that a firm of machinery and general hardware dealers in his district desires to import direct from the United States. It is particularly interested in metal-working machinery, lubricators, soldering torches, pumps, petroleum burners, lifting jacks, and general hardware novelties.

No. 7,591. Cerasin and Carnauba Wax.—A report from an American consulate in Mexico states that a resident in his district desires to communicate with wholesale dealers of cerasin and carnauba wax in Chicago, St. Louis, or New Orleans. He states that he has been purchasing these articles in New York, but finds that it requires too long time to secure a shipment, and consequently would prefer to make his purchases from dealers nearer to his place of business.

No. 7,649. Electro-technical Goods and Machinery.—A European business firm informs an American consular officer that it has extensive connections among manufacturers in various countries, and would like to get in touch with American manufacturers. It is of the opinion that if it could buy direct it would be able to do a fairly large business in American goods. The firm is especially interested in electro-technical goods, machine tools, sheet-metal working devices, belting, traveling cranes, testing machines for building materials, valves, stuffing boxes, crucibles, etc.

[In applying for addresses at Bureau of Manufactures, Washington, D. C., refer to file number.]

FIRES

Smith & Kent, manufacturers of brass goods, Chicago, Ill., occupied the fifth and sixth floors of the brick building at Fulton and Desplaines streets which was destroyed by fire on December 23. The total loss was $100,000.

The plant of Bernard Rees & Company was damaged and that of The Electrose Manufacturing Company burned down in the $500,000 fire which destroyed two factories, employing more than 700 persons, and a double tenement house in Brooklyn, N. Y., on December 22.

REMOVALS

The Crescent Brass Manufacturing Company, metal spinners, Cleveland, Ohio, expect in the near future to move to 8410-12 Lake avenue.

Fritz A. Schulz, manufacturer of metal spinning lathes, tools, power presses, etc., Chicago, Ill., has recently moved from 218 Jefferson street to 4824-26 Lake street.

INCREASE OF CAPITAL STOCK

The Palmetto Metal Company, East Moline, Ill., has increased its capital stock from $100,000 to $500,000.

The Brown Brass Manufacturing Company, Napanee, Ind., has increased its capital stock from $10,000 to $20,000.

The M. H. Foundry Company, Belleville, Ill., has increased its capital stock from $10,000 to $50,000. A brass foundry will be operated in buildings which have been purchased from the Belleville Tack Company.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

INDIANA BRASS COMPANY, Frankfort, Ind. Capital stock, $10,000. To manufacture brass wares. Directors: J. A. Johnson, C. E. Williams and Celina J. Johnson, all of Frankfort.

QUINCY CASTING COMPANY, Quincy, Ill. Capital stock, $10,000. To carry on a general foundry business. Incorporators: Charles Schnellbacher, Lester, Willie and Geal Beale, all of Quincy.

THE KENNEDY-VANDERHOOF COMPANY, Ft. Wayne, Ind., Capital stock, $10,000. To manufacture and deal in metal goods. Incorporators: C. F. Kennedy, H. Vanderhoof and J. E. Espey, all of Chicago.

THE GENERAL WELDING COMPANY, Buffalo, N. Y. Capital stock, $15,000. To carry on a general welding business in metals. Incorporators: Edwin N. Smith, Henry G. Smith and Charles D. Magee, all of Buffalo, N. Y.

THE CLIMAX BRASS & MANUFACTURING COMPANY, Chicago. Capital stock, $21,000. To engage in a general brass and iron foundry and machine shop business. Incorporators: John S. Roberts, Emerson B. Stoddard and I. M. Adams, all of Chicago.

THE AMERICAN METAL SPECIALTIES COMPANY, Columbus, Ohio. Capital stock, $10,000. To manufacture a line of metal specialties. Incorporators: Arthur M. Crumrine, Henry J. Sharp, Henry A. Heyse, Hubert G. Downer and J. E. Butler, all of Columbus.

PRINTED MATTER

METALS.—The Standard Rolling Mills, Inc., manufacturers of sheet block tin, pewter, britannia casting metals and special compounds, 361 Hudson avenue, Brooklyn, N. Y., are sending out a calendar to the trade on which they state, "No order too small to receive our careful attention or too large for our facilities."

PLATERS' MATERIALS.—The Harral Soap Company, manufacturers of platers' compounds, 465 Greenwich street, New York, have issued several leaflets descriptive of their basket plunger soap, which is guaranteed to remove hard rouge from silverplated flatware; and their cutting compound for cutting, stamping and drawing.

DIPPING BASKETS: John F. Smith & Company, New Haven, Conn., announce in a small folder descriptions of their dipping baskets for plating, tinning, washing work, etc., made of brass, copper and iron. The company are also manufacturers of railing, window guards, grills, trellises, wire cloth, etc. Prices and circulars upon application.

METALS.—Treatises Nos. 5 and 6 of a series of concise articles on the basic metals have just been issued by the Lumen Bearing Company, brass founders, Buffalo, N. Y. These treatises are devoted to lead and zinc, and some very interesting data are given. Copies of the entire series may be obtained by corresponding with the above company.

GRINDING AND POLISHING MACHINERY: The J. G. Blount Company, Everett, Mass., describe in Catalogue No. 13 a full line of grinding, polishing machinery and speed lathes. The catalogue shows only their regular line of tools, and prices will be quoted upon receipt of specifications for any changes that are necessary to adapt these machines or tools to the requirements of special manufacturers. Correspondence is respectfully solicited.

FURNACES.—Tate, Jones & Company, engineers and manufacturers, Pittsburgh, Pa., describe and illustrate their extensive line of furnaces for heating, forging and welding in a new catalog of thirty-two pages. The half tones of the various types of furnaces are clear and distinct, and the descriptive matter is printed in an interesting and understandable manner, and the catalog should prove very valuable to anyone interested in such furnaces.

GRINDING MACHINES: The Standard Universal Grinder is described and illustrated in any eight-page pamphlet issued by the American Tool & Machine Company, Boston, Mass. This grinder the company state has been developed in a most careful manner and no expense has been spared to make it a first-class manufacturing machine, durable and reliable in every respect. Additional information regarding the grinder will be furnished upon request.

CHEMICALS.—The Roessler & Hasslacher Chemical Company, New York, have issued a small booklet describing the four triple salts which they are introducing for use in electroplating with copper, zinc, gold and silver. These chemicals are known as "Trisalytes" and are claimed to be a perfect combination in a single salt of great purity of the ingredients of the respective baths. The little booklet gives descriptions and directions for making up the baths and for operating the same when in use. Copies will be sent upon request.

POLISHING, BUFFING AND GRINDING MACHINES: The Connecticut Dynamo and Motor Company, Irvington, N. J., give a full description, together with illustrations, of their motor type of polishing, buffing and grinding machines in an eight-page pamphlet just issued. These machines, which have been on the market for a number of years, are claimed to have proven themselves to be the best and most economical direct connected electric, polishing, buffing and grinding machines in use. Copies of the pamphlet will be mailed upon request.

SALAMAC: The Grasselli Chemical Company, New York, have issued a folder giving description of Salamac, a new kind of lump sal ammoniac. This product is in blocks 8 ins. long by 1½ ins. square, weighing 18 ozs., and the company claim that Salamac is equal in quality in every other respect to the best lump sal ammoniac on the market and being in block shape it is ready for use, there is no waste and it is very convenient to handle. Prices are as follows: 10-lb. lots, 20 cents per lb.; 50-lb. lots, 15 cents per pound; 100-lb. lots, 14 cents per lb.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at THE METAL INDUSTRY office, 99 John street, New York. THE METAL INDUSTRY is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

AD NEWS

The Platinide Company, Melrose Highlands, Mass., advertise "Platinide," a substitute for platinum.

White & Bro., Inc., Philadelphia, Pa., advertise their casting copper. This firm of smelters and refiners has been established since 1869.

C. K. Shelo, 600 Jackson avenue, New York, announces that all castings made in his pure aluminum foundry are guaranteed satisfactory.

The Newport Sand Bank Company, Newport, Ky., advertise their Newport sand for all foundry purposes. They invite inquiries for samples and quotations.

The Jantz & Leist Electric Company, Cincinnati, O., feature in this issue their well-known plating dynamo, particulars of which will be sent to interested readers on application.

The Richmond Cedar Works, Richmond, Va., illustrate the "J. I. C." foundry pail, which they claim is the best foundry pail in the market. It is made of oak or cedar as preferred.

The Goodale Company, Kalamazoo, Mich., invite foundrymen to send for information regarding their aluminum match plates, which they claim will pay for themselves in a short time.

The U. S. Electro Galvanizing Company, 1-9 Park avenue, Brooklyn, N. Y., have a two-page advertisement describing their electro-galvanizing process and patent handling devices.

The Holtzer-Cabot Electric Company, Chicago, Ill., advertise their plating dynamos. This well-known company makes various kinds of electrical apparatus of particular interest to platers.

M. L. Barrett & Company, 233 West Lake street, Chicago, Ill., manufacturers of lacquers, fusel oil, amyl acetate, etc., give some particulars regarding their products in their advertisement in this issue.

The General Chemical Company, Lafayette building, Philadelphia, Pa., advertise phosphorus, for making phosphor bronze, copper, tin, etc.; and hydrofluoric acid for cleaning metals and other uses.

The North American Smelting & Refining Company, Philadelphia, Pa., give several good reasons in their advertisement why they can furnish the best quality of metals of all kinds at the lowest prices.

Charles F. L'Hommedieu & Sons Company, 24 South Clinton street, Chicago, Ill., has a page in this issue advertising the Reliance plating dynamos, tumbling barrels, and other equipment for platers and polishers.

The Canton Foundry & Machine Company, Canton, O., build emery grinders, drop presses, rolls, hoists, shears and many other kinds of metal working machinery. They make a specialty of machinery made to order.

The American Metal Company, 52 Broadway, New York, who are sole agent for all French producers of aluminum, advertise their 99 per cent. guaranteed aluminum and high grade manganese-copper in this issue.

H. A. Stiles & Company, 161 High street, Boston, Mass., manufacturers of Ottoman and Naxos brands, pure Turkish emery, call attention in this issue to their emery, which they claim will do more work than any other brand.

The Crescent Brass Manufacturing Company, 8410 Lake avenue, Cleveland, O., do metal spinning in brass, copper, aluminum, zinc and steel. No job is too large for them. This company has a card on another page.

The Northern Engineering Works, Detroit, Mich., who are large manufacturers of electric, pneumatic and hand cranes, call attention to their products in this issue and invite interested persons to send for descriptive bulletins.

Nathan Trotter & Company, 36 North Front street, Philadelphia, Pa., which is one of the oldest metal concerns in America, having been established in 1789, have taken space in the directory of metal smelters in which to advertise their products.

Rockhill & Vietor, 114 John street, New York, announce that nearly one hundred Nonesuch Electro-plating Machines have been sold to representative concerns since their introduction to the trade in 1910. Their advertisement gives further information.

The Ohio Manufacturing Company, Painsville, O., advertise their steel foundry and shop barrels, taper shop boxes, annealing pans, adjustable shop stools, etc. Their factory is devoted principally to the manufacture of metal shop furniture and fittings.

The Cleveland Platers' Supply Company, Cleveland, O., announce that they have four hundred copies of a fourteen page Treatise on Electric Cleaners, which they will mail gratis to those filling out and sending to them the coupon printed in their advertisement.

The Backus & Leeser Company, 410 West 13th street, New York, call attention to their complete line of electro-plating and polishing materials, machines and chemicals. They furnish everything in these lines promptly at lowest prices and of superior quality.

The Automatic Buffing Machine Company, Buffalo, N. Y., publish a list of users of their machines that is quite impressive, containing as it does the names of many prominent metal manufacturers. Their advertisement also gives the classes of work for which these machines are suitable.

Richards & Company, 200 Causeway street, Boston, Mass., are 100 years old this year, and their advertisement tells how their policy of always giving full value and furnishing only the best quality of metals has been the factor that has enabled them to prosper and grow during a whole century.

The Thos. Buchanan Company, 216 Elm street, Cincinnati, O., supply complete electro-plating outfits, grinding machinery, abrasives, etc. The company requests inquiries for quotations and is prepared to make prompt delivery of almost anything required in the plating, polishing and grinding trades.

The Riehl Manufacturing Company, Cleveland, O., have a striking page advertisement devoted to their various standard and special wheel brushes, etc. They make wheels of every kind and are represented in the east by Whitehead Brothers Company, New York, and the S. H. Brand Company, Chicago, Ill., both of which are large dealers in foundry supplies, etc.

The advertisement of L. Vogelstein & Company, 42 Broadway, New York, who are large dealers in copper, tin, lead and spelter, call attention to the fact that they are agents for Aron Hirsch & Sons, Halberstadt, Germany; general agents for United States Metal Refining Co., Chrome, N. J., and selling agents for the American Zinc, Lead & Smelting Co., Caney and Dearing, Kansas.

Divine Bros. Company, Utica, N. Y., who state that they operate the largest and only plant making polishing and buffing wheels exclusively, show in their double-page advertisement some views of their extensive factory, also a cut of their new and complete catalogue relating to polishing and buffing wheels. This catalogue contains sixty-four pages of practical descriptions of all kinds of polishing and buffing wheels and will be mailed to persons using such goods on request.

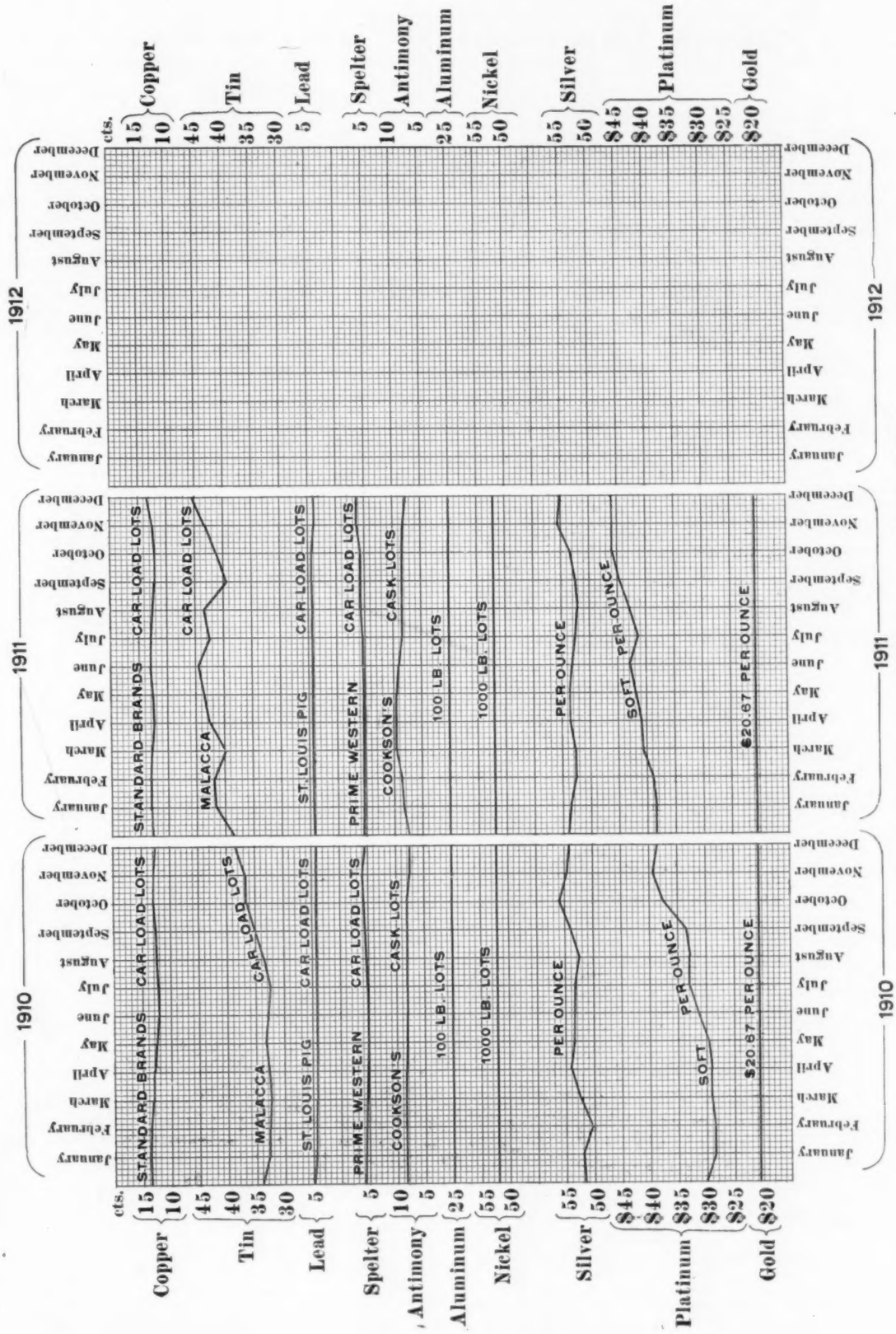


CHART OF METAL PRICES

Pig Iron and Metal Products of the United States

Calendar Years 1902-1910. (1911 Estimated.)

(FROM THE UNITED STATES GEOLOGICAL SURVEY.)

PRODUCTS. METALLIC.	1902. Quantity.	1902. Value.	1903. Quantity.	1903. Value.	1904. Quantity.	1904. Value.	Products.
Pig iron (spot value) long tons	17,821,307	$372,775,000	18,009,252	$344,350,000	16,497,033	$233,025,000	Pig iron.
Silver, commercial value, troy ounces	55,500,000	29,415,000	54,300,000	29,322,000	57,682,800	33,456,000	Silver.
Gold, coining value, troy ounces	3,870,000	80,000,000	3,560,000	73,591,700	3,892,480	80,464,700	Gold.
Copper, value at New York City, pounds	659,508,644	76,568,954	698,044,517	91,506,006	812,537,267	105,629,845	Copper.
Lead, value at New York City, short tons	270,000	22,140,000	282,000	23,520,000	307,000	26,402,000	Lead.
Zinc, value at New York City, short tons	156,927	14,625,596	159,219	16,717,995	186,702	18,670,200	Zinc.
Quicksilver, value at S. Francisco, flasks	34,291	1,467,848	35,620	1,544,934	34,570	1,503,795	Q'ksilver.
Aluminum, value at Pittsburgh, pounds.	7,300,000	2,284,590	7,500,000	2,284,900	8,600,000	2,477,000	Aluminum.
Antimony, value at S. F'cisco, short tons	3,561	634,506	3,128	548,433	3,057	505,524	Antimony.
Nickel, value at Philadelphia, pounds	5,748	2,701	114,200	45,900	24,000	11,400	Nickel.
Tin, pounds	.....	.....	.....	.....	.....	.....	Tin.
Platinum, value (crude) at New York City, troy ounces	94	1,814	110	2,080	200	4,160	Platinum.
Total value of metallic products	.....	$599,916,009	.....	$583,433,948	.....	$502,149,624	

PRODUCTS. METALLIC.	1905. Quantity.	1905. Value.	1906. Quantity.	1906. Value.	1907. Quantity.	1907. Value.	Products.
Pig iron (spot value) long tons	22,992,380	$382,450,000	25,307,191	$505,700,000	25,781,361	$529,958,000	Pig iron.
Silver, commercial value, troy ounces	56,101,600	34,221,976	56,517,900	38,256,400	56,514,400	37,299,700	Silver.
Gold, coining value, troy ounces	4,265,742	88,180,700	4,565,333	94,373,800	4,374,827	90,435,700	Gold.
Copper, value at New York City, pounds	901,907,843	139,795,716	917,805,682	177,595,888	868,996,491	173,799,300	Copper.
Lead, value at New York City, short tons	302,000	28,690,000	350,153	39,917,442	365,166	38,707,596	Lead.
Zinc, value at New York City, short tons	203,849	24,034,182	199,694	24,362,668	223,745	26,401,910	Zinc.
Quicksilver, value at S. Francisco, flasks	30,451	1,103,120	26,238	958,634	21,567	828,931	Q'ksilver.
Aluminum, value at Pittsburgh, pounds.	11,347,000	3,246,300	14,910,000	4,262,286	17,211,039	4,926,948	Aluminum.
Antimony, value at S. F'cisco, short tons	3,240	705,787	1,766	602,949	2,022	622,046	Antimony.
Nickel, value at Philadelphia, pounds	.....	.....	.....	.....	9,910	1,322,985	Nickel.
Tin, pounds	.....	.....	.....	35,600	.....	33,285	Tin.
Platinum, value (crude) at New York City, troy ounces	318	5,320	1,439	45,189	357	10,589	Platinum.
Total value of metallic products	.....	$702,453,101	.....	$886,110,856	.....	$903,802,244	

PRODUCTS. METALLIC.	1908. Quantity.	1908. Value.	1909. Quantity.	1909. Value.	1910. Quantity.	1910. Value.	Products.
Pig iron (spot value) long tons	15,936,018	$254,321,000	25,711,846	$437,101,382	27,303,567	$425,115,235	Pig iron.
Silver, commercial value, troy ounces	52,440,800	28,050,600	54,721,500	28,455,200	57,137,900	30,854,500	Silver.
Gold, coining value, troy ounces	4,574,340	94,560,000	4,821,701	99,673,400	4,657,018	96,269,100	Gold.
Copper, value at New York City, pounds	942,570,721	124,419,335	1,092,951,624	142,083,711	1,080,159,509	137,180,257	Copper.
Lead, value at New York City, short tons	310,762	26,104,008	444,363	38,215,000	372,227	32,755,976	Lead.
Zinz, value at New York City, short tons	190,749	17,930,406	268,215	28,967,220	252,479	27,267,732	Zinc.
Quicksilver, value at S. Francisco, flasks	19,752	824,146	21,075	943,022	20,601	958,153	Q'ksilver.
Aluminum, value at Pittsburgh, pounds.	11,152,000	2,434,600	15,000,000	3,750,000	(h) 47,734,000	8,955,700	Aluminum.
Antimonial Lead, short tons	13,629	1,264,771	12,860	1,231,019	14,069	1,338,090	Antim. l'd.
Nickel, value at Philadelphia, pounds	.....	.....	19,284,172	10,027,769	25,359,544	13,186,963	Nickel.
Tin, pounds	.....	.....	.....	4,832	.....	23,447	Tin.
Platinum, value (crude) at New York City, troy ounces	750	14,250	638	15,950	773	25,277	Platinum.
Total value of metallic products	.....	$549,923,116	.....	$799,216,654	.....	$760,743,467	

1911 (ESTIMATED).

PRODUCTS. METALLIC.	Quantity.	Value. Total.	Value. Per Unit.
*Pig iron, long tons	23,647,451	$373,629,715	$15.75
†Copper, pounds	1,091,554,000	135,352,696	.124
†Gold, ounces fine	4,462,800	96,233,528	20.67
†Lead, short tons	487,000	43,876,800	90.00
*Quicksilver, flasks	21,500	1,080,375	67
†Silver, ounces fine	57,796,117	31,781,866	.53
†Zinc, short tons	288,044	33,837,000	114.00
*Nickel (a) pounds	26,716,643	13,892,654	.52
*Aluminum (b) pounds	.....	.....	.25

(a) Smelted in the United States for metal, oxide and salts.
(b) Production from ores originating in the United States.
Figures for metals marked * from Engineering and Mining Journal.
Figures for metals marked † from United States Geological Survey.
(h) Consumption 1910.

Metal Prices, January 15, 1912

NEW METALS.	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, carload lots	14.25
Electrolytic, carload lots	14.20
Casting, carload lots	14.00
TIN—Duty Free.	
Straits of Malacca, carload lots	42.50
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2⅜c. per lb.	
Pig lead, carload lots	4.50
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western, carload lots	6.45
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots	25.00
100 lb. lots	19.50
Ton lots	18.25
ANTIMONY—Duty 1½c. per lb.	
Cookson's cask lots, nominal	7.75
Hallett's cask lots	7.70
Chinese	7.00
Hungarian grade	7.00
NICKEL—Duty Ingot, 6c. per lb. Sheet, strips and wire 35 per cent. ad valorem.	
Shot, Plaquettes, Ingots, Blocks according to quantity	.43 to .60
MANGANESE METAL—Duty 20 per cent	.90
MAGNESIUM METAL—Duty 3 cents per pound and 25 per cent. ad valorem (100 lb. lots)	1.50
BISMUTH—Duty free	2.00
CADMIUM—Duty free	.90
CHROMIUM METAL—Duty 25 per cent. ad val	.98
QUICKSILVER—Duty 7c. per lb	.60
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	46.25
SILVER—Duty free	.54⅞

Dealers' Buying Prices. Cents per 2lb.	OLD METALS.	Dealers' Selling Prices. Cents per lb.
12.50 to 12.75	Heavy Cut Copper	13.50 to 13.75
12.00 to 12.25	Copper Wire	13.00 to 13.25
10.75 to 11.00	Light Copper	11.75 to 12.00
10.25 to 10.75	Heavy Mach. Comp.	11.25 to 11.75
8.25 to 8.50	Heavy Brass	9.00 to 9.25
6.00 to 6.25	Light Brass	7.25 to 7.75
8.00 to 8.50	No. 1 Yellow Brass Turnings	8.75 to 9.00
9.00 to 9.50	No. 1 Comp. Turnings	10.25 to 10.50
3.90 to 4.00	Heavy Lead	—— to 4.25
3.75 to 3.90	Zinc Scrap	—— to 4.25
5.00 to 5.50	Scrap Aluminum, turnings	6.00 to 7.50
10.00 to 12.00	Scrap Aluminum, cast, alloyed	11.00 to 13.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 17.50
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
20.00 to 23.00	Old Nickel	23.00 to 26.00

INGOT METALS.	Price per lb. Cents.
Silicon Copper, 10% to 20%..according to quantity	28¾ to 32
Silicon Copper, 30% guaranteed " "	32 to 35
Phosphor Copper, 5% " "	19 to 21
Phosphor Copper, guaranteed 15% " "	23 to 26
Manganese Copper, 30% " "	35 to 40
Phosphor Tin " "	49 to 51
Brass Ingot, Yellow " "	9½ to 10½
Brass Ingot, Red " "	12 to 13
Bronze Ingot " "	12½ to 13¼
Manganese Bronze " "	17½ to 19
Phosphor Bronze " "	13 to 16
Casting Aluminum Alloys " "	19½ to 20¾
PHOSPHORUS—Duty 18c. per lb. According to quantity	30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 19.00 Cents. per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ⅜ inch diameter or over.....Base Price.

(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

	Cents per lb.
ZINC—Duty, sheet, 1½c. per lb.	
Carload lots, standard sizes and gauges, at mill	8 less 8%
Casks, jobbers' prices	8¾
Open casks, jobbers' prices	9¼

Metal Prices, January 15, 1912

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect January 11, 1912, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14⅜	$0.16⅜	$0.17⅞
Wire	.14½	.16⅝	.17⅞
Rod	.14½	.17⅛	.18⅞
Brazed tubing	.19½	——	.22⅝
Open seam tubing	.18½	——	.20⅝
Angles and channels, plain	.18¼	——	.20⅝

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 8.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass	1½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.16	$0.17⅝	$0.19⅛
Wire	.15⅜	.17⅜	.19⅛
Rod	.15¾	.18⅜	.20⅛
Brazed tubing	.20¾	——	.23⅞
Open seam tubing	.19⅜	——	.21⅞
Angles and channels, plain	.19½	——	.21⅞

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 8.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass	1½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

15.75 per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	18½c.	per lb. base
100 lbs. to 300 lbs. in one order	19c.	" " "
Less than 100 lbs. in one order	20½c.	" " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in O. D. Nos. 4 to 13 Stubs' Gauge, 18c. per lb.
Seamless Copper Tubin, 21c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	26	25	20	19	18	18	18	18	18	18	18	19	20	22	24	25

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 55%.

PRICES FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Rod	17c.	net base
Muntz or Yellow Metal Sheathing (14" x 48")	15½c.	" "
" " " Rectangular sheets other than Sheathing	17½c.	" "
" " " Rod	15½c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 24c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 2c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 3c. above price of pig tin.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than..... and including.....	3in. 12in. in coils.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.
No. 13 and heavier		34	34	36	36	36	36	39	39	39
" 14		34	34	36	36	36	36	39	39	39
" 15		34	34	36	36	36	36	39	39	39
" 16		34	34	36	36	36	36	39	39	39
" 17		34	34	36	36	36	36	39	39	39
" 18		34	34	36	36	36	36	39	39	42
" 19		34	34	36	36	36	36	39	40	43
" 20		34	36	36	36	36	38	41	42	44
" 21		34	38	38	38	38	40	43	44	50
" 22		34	38	38	38	40	40	43	47	51
" 23		34	38	38	38	40	40	43	49	52
" 24		34	38	40	42	42	42	45	51	54
" 25		36	39	41	43	43	43	46	53	57
" 26		36	39	42	46	46	46	51	55	61
" 27		36	40	44	48	48	49	54	58	64
" 28		36	40	46	48	49	49	56	62	67
" 29		38	41	48	50	52	52	61	67	72
" 30		38	42	50	52	56	62	69	72	77
" 31		43	47	55	58	63	71	74	77	83
" 32		45	49	57	61	69	77	91	90	95
" 33		47	51	60	65	73	84	91	100	110
" 34		50	55	62	70	78	91	103	110	120
" 35		..	65	70	80	90	100	115	125	..
" 36		..	80	90	100	115	120	135	..	..
" 37		..	104	114	129	144	159	174	..	..
" 38		..	124	139	154	169	184	204	..	..
" 39		..	144	164	184	204	224	..	..	..
" 40		..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 3 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	27	24	..	..	14	20	10	9	16	23
12.	.109.	..	..	..	..	..	..	..	26	..	..	..	15	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	17	..	..	..	..	..
16.	.065.	..	..	..	..	..	28	27	27	24	23	21	21	21	21	27	31	57
18.	.049.	..	..	..	..	33	30	29	28	25	26	26	26	..	..	..	..	..
20.	.035.	117	..	46	39	34	33	32	30	29	30	30	30	31	38	49	58	81
21.	.032.	..	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	138	98	48	42	38	37	35	34	..	..	45	..	..	..	..	..	..
24.	.022.	188	133	108	88	79	73	62	60	66	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter, B. & S. G'ge	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb.	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4 per cent.	to No. 19, B. & S. Gauge, inclusive			$0.60
6 "	" 19, " " "			.70
9 "	" 19, " " "			.85
12 "	" 19, " " "			1.00
15 "	" 19, " " "			1.15
16 "	" 19, " " "			1.20
18 "	" 19, " " "			1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. to 3½c. above the price of bullion.

METAL MARKET REVIEW FOR 1911—OUTLOOK FOR 1912

By J. J. ARCHER.

The year 1911 started in a slough of despond. There was a feeling of pessimism all over the country, a general dread of the coming Supreme Court decision and when the Commerce Commission refused the freight advances asked by the railroads, the railroads turned sulky and helped to make matters worse by shutting off as much as possible all buying of new equipment. This, of course, helped to accentuate the general feeling of pessimism, and prices of all materials naturally declined; Wall Street went through a period of liquidation, but that did not in any way alter the intrinsic values of any of the properties, the prices of stocks had been artificially boosted and the liquidation was justified. The railroads today, with the moral support or backing of the Commerce Court are in better shape than ever before, the Standard Oil and Tobacco Trusts have conformed to the law, and the business of the country in general has made enormous strides. The fears and dread of what was going to happen were out of all proportion to the actual happenings. The country at large has been notified in forceful language, with the highest courts of the land behind it, that the laws of the land must be obeyed, and the business world today is better for it in every way.

For the coming year we feel that the basic conditions have never been better, the liquidation the Nation has passed through has cleared the atmosphere. Prospects for 1912 are bright. The railroads have already ordered some of the material that was probably absolutely necessary. Money has never been cheaper than it is today, and confidence, the mainspring of all industry, is gradually being re-established, and the indications are that the business world is more than ready to go ahead.

COPPER.

In writing this review of the copper market for the year 1911, the table of the exports each month pretty well tells the whole story. Until towards the last quarter of the year the course of the copper market had been very dull and uneventful. The fluctuations in the monthly averages of Lake copper show a variation of only half a cent for the first six months of the year, and at the close of the year prices are a little over one cent per pound above the opening prices in January, 1911.

Lake copper was then quotable at around 12¾ cents, Electrolytic 12½ cents, and Casting brands at 12⅜ cents, the market was dull and sluggish, and prices gradually declined until May, when the lowest figures of the year were reached. Lake was quoted at 12¼ cents, Electrolytic 12 cents, and Casting at a shade lower. The market seemed to be weak, and domestic consumers held off, and 11 and 10 cents was freely predicted for the metal.

From the drift of prices during the year, with the low point in May, we note an increase in values by November of fully ½ cent per pound, and from November to the end of December, the market advanced a full cent, closing strong and active, with Lake at 14¼ cents, Electrolytic at 14⅛, and Casting brands at 14 cents. The advance in December was very rapid, and during the early days of January, 1912, it looked as though sellers had rather overdone their part of the work, as at the moment of writing there is a very decided lull in the buying movement, and it is quite likely we may see a slight reaction.

Statistically, the copper market is in very good shape. The surplus stocks of refined copper, according to the Copper Producers' Association, are considerably less than one month's requirements.

The stocks in England and France January 1, 1912 (visible supply), were 57,280 tons, against 83,800 tons on January 1, 1911, showing a decrease of 26,520 tons, or over 59,000,000 pounds, while the domestic stocks, as published by the Copper Producers' Association, December 31, 1911, show a total of 89,454,695 pounds, against a stock of 122,030,195 pounds on January 1, 1911, making a decrease during the year 1911 of 32,575,500 pounds in the world's visible supply of copper. In connection with the domestic figures, it is to be noted that there is an apparent surplus of possibly some 8,000,000 pounds held by producers but not yet refined.

The Government statistics for 1911, as compiled by the Geological Survey, show an increase of about 11,000,000 pounds of blister and Lake copper over the 1910 production. This report does not take into account copper made from imported ores.

The imports for the year are about 8,000,000 pounds less than in 1910—(December estimated).

The exports in December were 37,430 tons, against 31,626 tons a year ago, and the total exports for the year were 336,506 tons, against 301,935 tons in 1910.

TIN.

The history of the tin market for 1911 is altogether too erratic and speculative to be of benefit to anyone.

The market during the entire year has been dominated by a powerful London syndicate that has put prices up or down as it suited its purpose. The laws of supply and demand have not in any way or at any time controlled the market, but prices have been dominated absolutely by a group of speculators simply playing the game for all there is in it—and at the game they are experts; they certainly get all there is in it, and the American consumer pays the bill. This is almost a repetition of the 1910 review, but the game is still on, and as we said then, the end is not in sight.

Statistically, the market is very little changed from a year ago today. December 31 the total visible supply is 680 tons less than a year ago. The total consumption for the year shows a decrease of 1,050 tons, compared with 1910. The shipments from the Straits for the year were 505 larger than in 1910.

The outlook for 1912 is not very bright, the bull clique still controls, and, realizing this condition, it is absolutely necessary for the American consumer to watch the market most carefully and buy on every break. Prices dropped £15 in two days early in January, and consumers came into the market freely; that is all there is to do, and that is the only way this game can be beaten.

The market at the end of December stood at 45 cents; today it is around 42½, and next week it may be 40 cents or 45 cents.

Another way to beat this "hold-up" game is to take brands of tin other than Straits. There are some pure English brands of tin that come to this market regularly, notably Williams, Harvey, Lamb and Flag tin—one of the best known and purest brands, and American consumers should make a point for their own benefit and a tremendous saving over the highly speculative Straits brands. Williams, Harvey, Lamb and Flag is quoted today at 41½ cents, against Straits at 43¾ cents.

LEAD.

The United States Geological Survey estimates the production of refined lead from domestic and foreign ores in 1911 was approximately 487,520 short tons, as compared to 470,380 tons in 1910, and 448,112 tons in 1909. This report calls special attention to the virtual wiping out of the heavy stocks of foreign lead in bonded smelting warehouses, consisting of 35,972 short tons.

The consumption for the year is computed as 391,000 tons, as compared with 376,021 tons in 1910, and 370,013 tons in 1909.

Prices during the year have been made by the Trust, regardless of the why or wherefore, and the trade just had to grin and bear it, and the funniest thing about this bunch of foreigners is that they will tell you that it is absolutely a benefit to consumers to have a stable, steady, lead market, and they were specially appointed by an All-Wise Providence to be the humble instrument to carry out this blessed benefit to the consumers of lead in this great and glorious country.

The duty is likely to be lessened, and this may make it easier for the crushed consumers.

The market is about 4½ New York and 4⅜ in St. Louis.

SPELTER.

The production of spelter for 1911, according to the United

States Geological Survey, broke all records. From domestic ores the estimate is 273,807 short tons, and from foreign ores 14,237 tons, making a total of 288,044 tons, as compared with 269,184 tons in 1910.

The price movement in spelter does not altogether hang very well with this government estimate of production. The year opened with spelter at 5½, New York prices declined a few months later to around 5.20, and after that the big three took hold of the market, and by very clever work ran prices up to 6.85 New York. It was not a case of a big consumption, but "really an absolute scarcity of metal," positively there was "no spelter in sight"; this was so well worked up that consumers were all loaded up from 6¼ to 6.85 New York basis, and then when this object had been accomplished the market broke to 6.10 New York, and everybody had spelter to sell, and nobody wanted it. All the talk of short supply and no spelter was rot—the advance was unjustifiable, and was a matter of manipulation, pure and unadulterated.

The market today is around 6.40 New York, about 20 points up from the break from 6.85.

ALUMINUM.

The uses for aluminum are only beginning to be known, and with the cheaper cost of production this metal is bound to be used much more extensively. Prices during the year have shown a generally sagging tendency, as against 22 cents a year ago. Aluminum is quoted today at from around 18 cents to 18½ cents, according to quantity and delivery.

ANTIMONY.

The antimony market during the year was more or less excited for a time over another foreign syndicate that did materialize; prices were run up about ½ cent per pound and soon ran down again. Cookson's is quotable at 7⅞ cents, Hallett's, 7¾, and Chinese at 6.90 cents.

SILVER.

The silver market during the year has held very steady at around 54 to 55 cents in New York, and 24½d. to 25½d. in London.

QUICKSILVER.

Prices of quicksilver during the year reached a higher level than for some time. Opening at $42 wholesale, quicksilver sold up to $48, and closes at $43. The production of quicksilver for 1911 is estimated at 21,500 flasks, against 22,418 in 1910 and 21,215 in 1909.

PLATINUM.

The imports for the year were 124,000 ounces, as compared with 122,820 ounces in 1910, and 114,916 ounces in 1909. Prices have advanced to the close of the year to $48.50 for hard, and $46 for ordinary refined.

SHEET METALS.

The price of sheet copper has been ruling around 16 cents base,. With an open market this price may have been shaded. Towards the last quarter of the year, with the advance in the base metal, sheet copper was rapidly advanced during December, closing at 19 cents base for sheet copper; wire, 15¼ base; high sheet brass, 15⅝; seamless copper tubing, 21 cents; seamless brass tubing, 18 cents base. There is a good demand from consumers, and the outlook is bright for 1912.

OLD METALS.

The year 1911 finishes in a blaze of glory as far as old metals are concerned. After a dull and unsatisfactory year the advance in copper at the close has given dealers a chance to turn some of their long held stocks into good money. The market was saved from utter stagnation by a steady and persistent demand for all kinds of copper scrap from Europe and considerable stock changed hands when prices were considerably lower than those ruling today. The market today is strong at the recent advances and the outlook good.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

		January 9, 1912.
Stocks of marketable copper of all kinds on hand at all points in the United States, December 1, 1911		111,785,188
Production of marketable copper in the United States from all domestic and foreign sources during December, 1911		122,896,697
		234,681,885
Deliveries:		
For domestic consumption	65,988,474	
For export	79,238,716	
		145,227,190
Stocks of marketable copper of all kinds on hand at all points in the United States, January 1, 1912		89,454,695
Stocks decreased during the month of December...		22,330,493

SUMMARY FOR THE YEAR 1911.

The total production was 1,431,938,338 pounds, total deliveries 1,464,513,838 pounds, domestic consumption 709,611,605 pounds, exports 754,902,233 pounds. These figures show a reduction of 32,575,500 pounds during the year and also showed that the total deliveries for the year exceeded the production by 32,575,500 pounds.

DECEMBER MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	14.35	13.20	13.85
Electrolytic	14.25	13.00	13.65
Casting	14.00	12.80	13.50
TIN	46.50	44.00	45.00
LEAD	4.50	4.45	4.45
SPELTER	7.00	6.40	6.65
ANTIMONY (Hallett's)	7.70	7.70	7.70
SILVER	.55⅝	.54¼	55.00

SHEET METAL MOVEMENTS YEARS 1909—1910—1911

Highest and lowest base prices (in cents per lb.) on sheet brass, sheet copper and sheet german silver.

	1909.		1910.		1911.	
	High.	Low.	High.	Low.	High.	Low.
Sheet brass....	16.00	13.00	15.25	13.25	15.625	12.75
Sheet copper..	19.00	17.00	19.00	18.00	19.00	16.00
Sheet German silver, 18%..	25.50	24.50	25.50	24.50	25.50	22.75

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.:

1911—January, 12⅞; February, 12¾; March, 12½; April, 12½; May 12⅜; June, 12⅝; July, 12¾; August, 12¼; September, 12⅝; October, 12½; November, 12⅞; December, 13⅞. Average for year, 12¾.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the back advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds. See Want Ad. pages.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.